The
Electrical Review

VOL. CXVI. MARCH 22, 1935. No. 2991.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Index to Advertisers—See page xl.

Principal Contents:

	PAGE
Electricity and Health	408
A Telephone Keysender	409
Magnetic Separating Drums. By H. E. Hutter	410
Earth Leakage Potentials. By T. C. Gilbert	411
Small Joints. By H. R. Taunton	412
Diesel-electric Thames Tug	413
Electrical Development	415
Meetings and Discussions	416
Correspondence: Rural Development; "Physician, Heal Thyself"; Sir Ralph the Rover; The Cost of Appliances; A London Change-over; A Skilled Man's Plaint; The Purchase of Coal; Safety in Theatres; Quick Boiling; Smoke Prevention	419
New Apparatus and Devices	422
British Overseas Electrical Trade	423
In the Courts	423
Parliamentary News	424
Business and Industrial Notes	425
Electricity Supply	429
Traction and Communications	431
Contract Information	432
Notes	433
Our Personal Column	434
New Companies Registered	435
City Notes	436
Published Specifications	439
New Work for Contractors	440

Our Development Organisation

WE wonder whether the electricity supply industry derives any substantial benefit, or even any benefit at all, from the annual luncheon given in London by the British Electrical Development Association.

Every year, with remarkable regularity, as we file from the luncheon room to the place of meeting, we hear somebody deploring that so excellent a publicity opportunity has been lost, and daily newspaper men laugh their surprise that such poor electrical material has been prepared for them—the most effective media for carrying propaganda to millions of readers.

It would all be very monotonous to those who have watched the Association from its early days if it were not for the rapid succession of Ministers of Transport. Mr. Hore-Belisha, the present holder of that office, is, in that capacity, head of electricity supply for the time being. Happily, he admitted that he hadn't come to teach the industry its business, though he knew that it depended upon publicity and advertising.

When we look for that class of matter in the speeches, however, we find little of it. The only thing that impressed us was his remark that generation having been organised it now rested *with the industry itself* to decide whether or not it was going to take full advantage of the changed situation in developing distribution.

The financial and other progress made by the Association during its first complete year as a reconstituted body is recorded in our abstract of the Council's report on page 415. The Central Board is contributing on a basis of £1 for £1, but if the Association is going to spend more money on films it will need a much larger income to enable it to satisfy the demand for really generous newspaper publicity.

With regard to the films which are now being shown in different parts of the country, the same mixed feelings that have been expressed by electrical men in our hearing, or in correspondence for publication, found their way into the annual meeting. There was enthusiastic support and there was emphatic criticism. Those who are so satisfied with the first attempt that they want a further effort made were given to understand by Sir William Ray that, while there had been unofficial conversations with producers regarding further films, no proposal was actually before E.D.A. Council.

At the luncheon, however, Sir Percival Bower seemed to promise an extension of the film campaign, backed up by an intensive Press campaign. The latter, in our opinion, is the very next thing that should receive attention. It might, perhaps, have been better to have done more of it before embarking upon the films. We believe, as we have already stated here, that if the newspaper Press of the metropolitan area carried impressive propaganda to the eight millions of people who reside therein, the effect would overflow into many other parts of the country, and we should hear no more of lack of electrical advertising or of the enterprise of gas producers. Doubtless lack of funds has been to blame, but we hope that the electricity companies which are now linking up in London, and some that are not, will be able to launch out on their own behalf.

After all, much as we may desire to see E.D.A. a brilliant success, we do not share any expectation that there will be a hundred-per-cent. membership at an early date, if ever, for some authorities are finding that they can do very satisfactory work meeting local requirements in their own way, and are therefore less dependent upon a central organisation.

We still feel that the Council ought to give serious thought to the suggestions that have been discussed here and in various other places for a more complete canvassing of the whole country—action locally organised with expert assistance forthcoming from E.D.A. headquarters. Perhaps the experience with the films will be helpful in that connection.

The Association is still proceeding by "trial and error," in spite of all its accumulated experience of fifteen years.

The Future of Distribution

DOES electricity distribution in this country need reorganising or is it already proceeding on the right lines? The answer appears to depend largely upon one's political views. Last year a Socialist author presented the case for the complete nationalisation of the supply industry; in this issue we review a book by a writer who believes that the existing system is not so bad as some people make it out to be, and that nationalisation would be the end of enterprise. But even he suggests that there should be some policeman-like central authority to keep an eye on the industry and occasionally instruct the laggards to "move on" or be taken up (or in). The true line of advance is probably neither complete national control nor a loose kind of supervision, but a gradual development of the existing organisation, with the full consent and co-operation of the authorities concerned, as circumstances seem to dictate.

Engineers Plus

THE discussion at the Institution of Electrical Engineers on the engineer-administrator makes one wonder whether we are not in danger of giving over-emphasis to the place of business knowledge and training in the equipment of the electrical engineer. In past days these things were more or less rigidly excluded from his course of studies, and had no place in the practical part of his works apprenticeship or pupilage. The demand for commercial engineers naturally followed. Nowadays there is a tendency to speak and write as though business or economic subjects ought almost to overwhelm the technical. If we consider for a moment the 15,000-odd membership of the Institution, what percentage of these, do we think, can ever hope to fill the rôle of engineer-administrator? We know quite well that by reason of temperament and on other grounds large numbers of them never would make their mark in such a capacity; further, we believe that they have no wish to do so; and, finally, the profession and industry have no place for them in great numbers. Let us not be misunderstood. We have long urged here the need for men well qualified to handle a technical proposition with the aid of a mind equipped for management and control, and to deal with a concession with financial and economic fitness. But we have also need for hosts of men who will follow an engineering career for its own sake, and become "compleat" engineers and remain so. From our own familiarity with the problems of the young student fresh from the college and the works we know how difficult it is for him, in thousands of cases, to become a specialist in anything but the technical career upon which he has set his heart. If other matters are to be sandwiched in, something technical may have to give place to it.

Steam Temperatures

A MEASURE of the debt of engineering to metallurgy is to be found in the trend towards higher steam temperatures in power-stations. The greatest achievement in this direction seems to be the B.T.H. machine built for Detroit, which is reported to be running quite satisfactorily at 1,000 deg. F. Temperatures exceeding 1,100 deg. are now being discussed, presumably owing to the large capacities of sets running at the maximum synchronous speed of 3,000 r.p.m., with their smaller relative dimensions. In his review of power-stations and their equipment in the March I.E.E. *Journal* Mr. I. V. Robinson suggests that this may lead to the construction of units with geared h.p. cylinders, the other cylinders running at a lower synchronous speed. That good use has been made of their opportunities by designers is evident from their leading the laboratory in this way, as the International Steam Tables Conference (whch is expected to produce authenticated data on the properties of steam up to 4,000 lb. per sq. in.) had not originally intended to investigate temperatures above 932 deg. Until recently high-pressure steam tables have been based upon observed conditions at low pressures by extrapolation, which Mr. Robinson refers to as "sanguine." The Detroit set is of 10,000 kW only, and the feasibility of applying such temperatures to machines of 50,000 kW and more remains to be proved.

Meeting Times

THE difference in the hours selected for meetings of the various technical institutions and associations is the subject of frequent comment. The I.E.E. ordinary meetings start at 6 p.m.; so do those of the Wireless and the Transmission Sections. On the other hand, the I.E.E. informal meetings, like those of the Meter and Instrument Section, are held at 7 p.m. The London Technical Group of the E.P.E.A., the A.S.E.E. and the Junior Institution of Engineers also find from 7 to 7.30 more convenient, while in the provinces round about 7 p.m. is generally favoured. A recent postal vote taken by the Illuminating Engineering Society proved the opinions of its members to be equally divided between the merits of having an early meal and of finishing the meeting early, thus supporting the view that the cleavage of opinion represented by the practice of the other societies mentioned represents a general condition. It was understood, however, that the non-voters preferred the existing arrangement (7 p.m. on Tuesdays), and the decision to continue as before is, no doubt, in conformity with the natural conservatism that is reluctant to change an established custom without pronounced compensatory advantages.

Barking's Record

THE nearer the approach towards the highest practicable thermal efficiency with given steam conditions, the keener seems to be the rivalry between capital stations. Only a few weeks ago we reported the achievement by the new Battersea station of over 28 per cent. efficiency on kWh generated. Now we learn that the high expectations entertained of Barking "B," which was described on its completion in our issue of February 2nd, 1934, have been more than fulfilled, last year's working proving the manufacturer's guarantees to have been conservative. The new plant was 20 per cent. better than that in the "A" station, part of which was installed only about six years ago, and during the past six weeks its thermal efficiency has consistently exceeded 28½ per cent. The decision to order a third 75,000-kW set, bringing the total capacity of the "B" station to 225,000 kW and of the Barking as a whole to 465,000 kW, is justified by the technical performance.

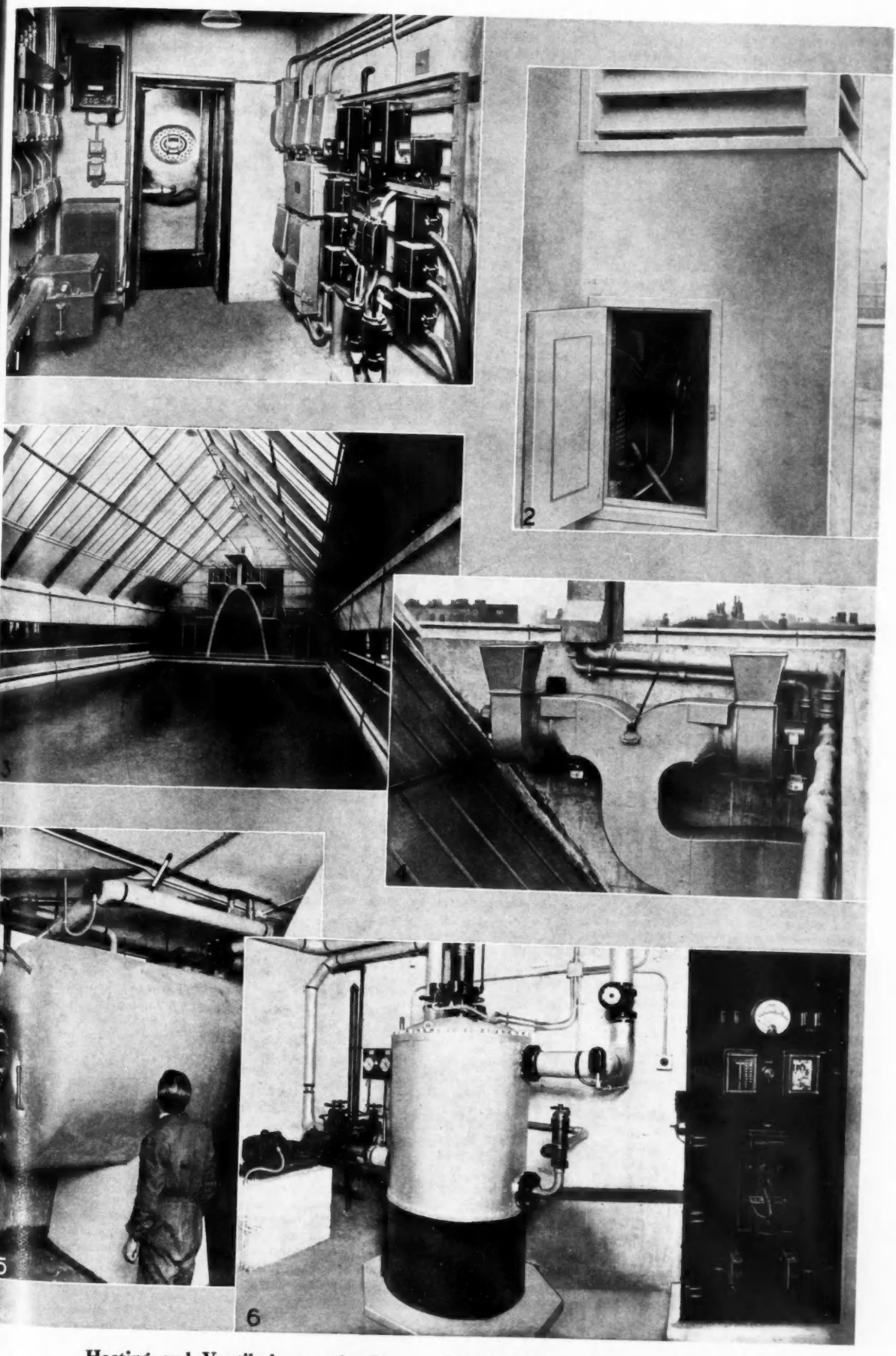
Rural Diversity Factor

A NOTABLE feature of the non-industrial supplies given in the Bedford rural demonstration area is that the demand is greater in the summer than in the winter. We have seen printometer records taken last month by the borough electrical engineer, Mr. R. W. L. Phillips, which show further that the maximum demand falls on a Sunday; this diversity with the total load (including the urban supplies) should be valuable in reducing the standing charges on the scheme. The reasons are that the electric cooker is, as in many other cases, the most important current-consuming apparatus in the agricultural area, and that wood and coal are largely used in the winter months.

A Town Without Chimneys

MASON CITY, Oregon, is a forerunner of many towns of the future. It has no chimneys, according to the *Electrical World*. It is a town with a population of 8,000, housing the workers on the $63,000,000 Grand Coulee hydro-electric project and their families. All the power, heating and lighting is electrical, energy being purchased from the Washington Water Power Co. Our contemporary says that the Washington State College is using this town as a "field" laboratory for studying the practicability of electric house heating. New "towns" are still springing up in this country; it would be interesting to make one all-electric.

1. Distribu
thermostat



Heating and Ventilation at the Pioneer Health Centre. (See next page)

1. Distribution chamber. 2. Dust extraction fan on roof. 3. The swimming pool. 4. Twin extraction fans on roof. 5. The thermostat and magnetic control valve on thermal storage cylinder. 6. Low-voltage electrode boiler, circulating pump and control cubicle

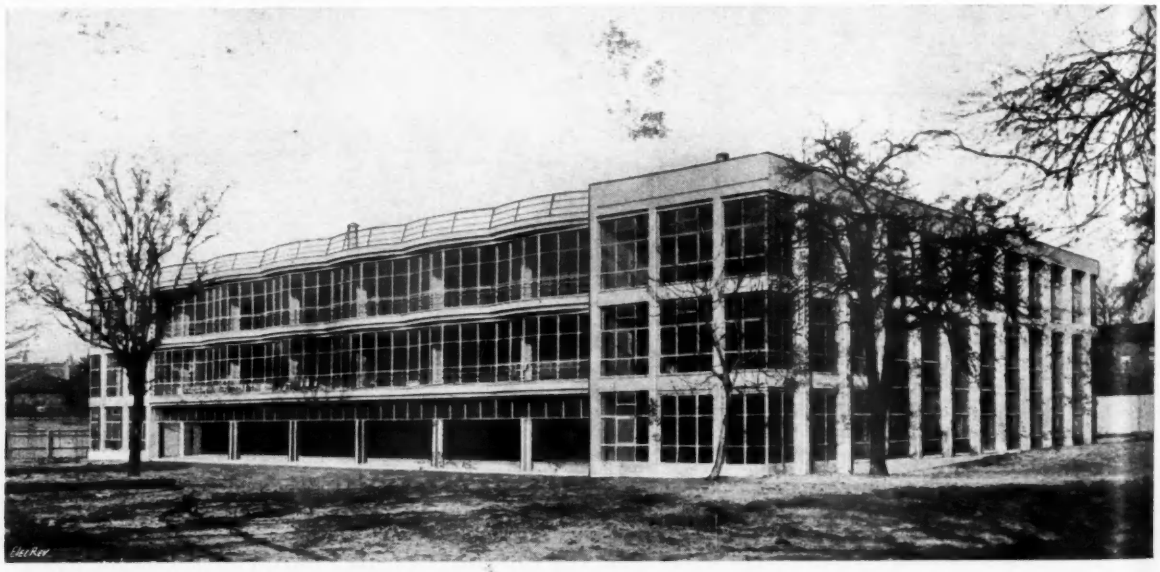
Electricity and Health

THE Pioneer Health Centre, which is being opened at Peckham next week has as its purpose the promotion of general well-being among a working-class clientele by the maintenance or improvement of physical fitness by means of recreational exercise, systematically practised under appropriate medical supervision.* The Centre is to be conducted on a family health club basis, very modest weekly subscriptions securing unusual amenities and facilities for physical culture, aided by extensive bathing, gymnastic, and instructive medico-clinical methods.

The three-floor building, designed by Sir E. Owen Williams, is entirely of reinforced concrete and of interest structurally, air conditioning having been unusually well provided for by the formation of ducts within the walls and floors, which are lined with cork. Thus very little exterior metal ducting has had to be used, while the air, water, and room heating is all-electric, these installations having been designed and carried out by Messrs. James Combe & Son., Ltd., on the electric water thermal storage off-peak principle.

A Warmed and Filtered Swimming Pool

Electricity is purchased from the County of London Electric Supply Co., Ltd., and delivered into a ground floor chamber at 2,300 V through h.v. oil circuit-breakers and two 300-kVA transformers stepping down to 400 V three-phase, thence through an l.v. oil circuit-breaker to three-phase bus-bars.



The Pioneer Health Centre, Peckham, London, S.E.

The thermal-storage water heating plant is grouped in an adjacent ground floor chamber. It is energised from the bus-bars through a Ferguson Pailin sheet-steel switch cubicle containing a hand-operated oil circuit-breaker and contactor gear for controlling the adjacent Bastian & Allen electrode water boiler rated at 500 kW, three-phase, 400 V, and operating under hydraulic and electric automatic control. Two associated water circulating pumps are driven by 1.5-h.p. Bull motors with Igranic push-button starters.

The thermal storage tanks are of 7,000 gallons capacity for heating the building and air warming, and of 2,000 gallons capacity for the supply of domestic hot water. A third hot water circuit serves the adults' indoor swimming pool, which is 75 ft. long and 35 ft. wide, with a depth varying from 3 ft. 3 in. to 10 ft. 6 in., and containing approximately 130,000 gallons of water, apart from the children's pool and slipper baths. The whole of the water is to be purified once every four hours by filtration plant supplied by Bell Bros. (1929), Ltd., while its temperature is raised by circulation through a special heat exchanger on its way back to the pool.

Two Mather and Platt circulating pumps are driven by Verity 12.5 h.p. motors with "Aston" starters and an electrical interlock that provides for automatically switching off the electrode boiler in the event of the circulating pump being stopped. Similarly, the boiler cannot be switched on unless the appropriate pump is running, except, of course, when the boiler is needed for one of the other two heating circuits.

The hot water contained in storage is delivered *via* a modulating valve under special thermostatic control and circulated through the heating and air conditioning systems, which comprise radiant panels, coils and radiators and an air heater battery to suit the various apartments. A primary circulating pump is installed for circulating the water between the storage vessels, heaters, and the electrode boiler, and here again interlocks are provided between the storage vessels, the boiler, and the pump.

The installation is arranged for completely automatic operation. The supply is switched on and off by means of a Venner time switch, the load taken being controlled by an automatic device fitted to the boiler, while the flow temperature of the water from the boiler and to each of the systems is again automatically controlled. Whenever the time switch or one of the other controls operates to shut down the boiler, the load is automatically reduced to the minimum before the circuit breaker opens. The controls are so arranged that the electrode boiler can be employed for heating the swimming pool, the storage cylinders, and/or the systems direct.

When heating the pool heat exchanger the boiler is under the control of a specially sensitive Drayton thermostat situated in the return main from the swimming pool so that the temperature of the water is maintained within a degree or so of the required figure. When heating for storage the boiler is under the control of a thermostat situated in the storage cylinder which automatically shuts down the boiler when the required temperature is attained in all or any of the systems as required. In addition, the boiler is under automatic load control, flow temperature control, pump interlock, and the master time switch which restricts consumption of electricity to off-peak periods. These arrangements are supplemented with "Satchwell" thermostatically controlled magnetic valves (made by the Magnetic Valve Co.), and the services may be supplied from the boiler independently or together according to seasonal or load requirements.

Room-heating Arrangements

The radiant panels, radiators and coils for warming the various apartments are supplied from secondary circulators accelerated by an independent secondary electrically driven pump, each circuit being independently controlled, and the main circuits are, in addition, fitted with thermostatically controlled magnetic valves.

The two swimming pools, gymnasium and lecture hall are supplied with conditioned air, passed through a viscous oil filter, warmed and delivered through ducts, most of which are concealed and form an integral part of the structure. Each section is under control, the fan being driven by a Bull 3-h.p. slip-ring motor arranged for 50 per cent. speed regulation, with Bradford and Airedale control gear, thus any or all sections can be used together or independently to ensure economy in maintenance. Air is extracted from the swimming pool, lavatories, lounge and restaurant by two twin and two single Keith Blackman duct fans concealed on the roof, each driven by a weather-proof motor with a water-tight "Magnet" isolating switch. Ventilation of the lavatories is separate with fans in duplicate.

*Its origin and purpose is described in "The Case for Action," by Innes H. Pearse, M.D., B.S (Lond.), and G. Scott Williamson, M.D. (Edin.), published by Faber & Faber, Ltd.

The hot-water requirements in the various parts of the building are dealt with by a separate 2,000-gallon storage tank indirectly heated during off-peak hours, supplemented by local water heaters serving the doctors' rooms and a booster heater for providing high-temperature water for the Hobart dish washing machine in the kitchen, which is electrically driven and provided with a booster pump for supplying high-pressure and high-temperature water for the rinsing sprays.

The local water heaters are two of 30 gall. capacity with 3-kW heaters and one of 30-gall. capacity with 6-kW Bastian pressure-type heaters. A Frigidaire refrigerator and ice-cream cabinet are installed, while a 30-kW service to the kitchen allows for the addition of other equipment. A service lift has been installed by the Lift & Hoist Co.

The wiring installation was carried out by Messrs. B. French, Ltd. Heavy gauge welded and screwed conduit encloses the Johnson & Phillips l.v. wiring, and the Ferranti meters and "M.E.M." switch- and fuse-gear are grouped in a distribution chamber on the ground floor next to the intake. There are three lighting distribution boards, one on each phase, in this switchroom and the main lighting circuits are switched back in this chamber.

In the apex of the glass roof of the swimming pool is a T-girder, suspended from which on rollers is a row of Benjamin "Saaflux" dispersive reflector fittings, which can be hauled to the diving board end for lamp renewals. "Benflux" fittings are utilised in the medical and dental rooms, where the pendant flexes are rubber covered and the lampholders and switches insulated.

In the restaurant architectural strip lighting has been employed with wiring troughs cut flush in the cork ceiling. In the lecture theatre cinema and stage lighting circuits have been provided, with interior general floodlighting. The gymnasium and flat roof will also probably be floodlighted.

A Telephone Keysender

A mechanical device for improving automatic service in business houses

MANIPULATION of the automatic telephone dial absorbs an appreciable amount of time, particularly in the London area where the seven-digit system is standardised and especially when calls have to be established in quick succession.

In private branch exchanges, for example, where an operator at a switchboard serving a number of internal lines is called upon to extend calls to the public automatic system, manipulation of a dial for every call has a very marked effect on operating efficiency. Throughout the time her attention is concentrated on the dial other calls which may be signalled on the switchboard cannot safely be attended to. Not until the last digit has been dialled can a reply safely be made to a second call. In addition to leading to the possibility of wrong numbers with inconvenience to users, a bad psychological effect on the operator results from this enforced lengthy concentration on one call while other calls are awaiting attention.

Since the speed of impulsing is fixed, it is impossible to decrease the actual time interval and the solution of the problem of affording relief to an operator lies in the provision of means whereby the digits may be "set up" at a speed higher than the impulsing speed on a device which will then send out the impulses at the correct lower speed.

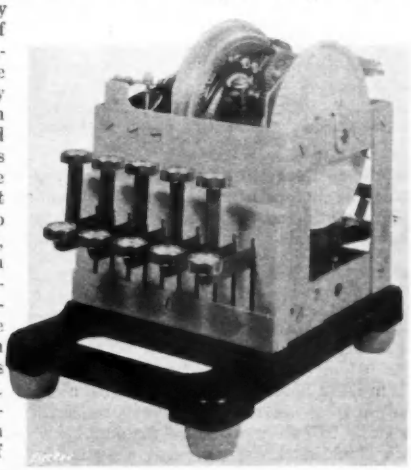
Such a device is the mechanical keysender. The original design of the Post Office has been developed for use on the switchboards of private branch exchanges in business houses. It "stores" digits as they are set up and it is in this respect that it differs fundamentally from the dial.

A private branch exchange equipped with a keysender

Keys projecting through the front of the sender carry the usual number or letter-and-number designations and are pivoted at the rear. Depression of a key gives an angular displacement to a rocker plate so positioned that the degree of its displacement is dependent upon the key depressed, being a minimum for digit 1 and a maximum for digit 0. This angular motion is communicated by a link to a pawl operating a ratchet. Fixed to this ratchet is a marking arm which moves round with it, becoming positioned for each digit over one of a number of pins inserted in the storage ring in the centre of the frame. The pins are a good sliding fit and when, on release of a depressed key, a simple striking mechanism operates, the marking arm pushes forward the "marked" pin, causing it to project on the other side of the storage ring. After keying a number, therefore, a series of pins is pushed forward, the space between successive projecting pins being governed by the angular motion of the ratchet, *i.e.*, by the key depressed.

The positions of projecting pins have now to be interpreted in a way which will give rise to the correct train of impulses. A cup at the centre of the storage ring houses a clock-type spring, which is wound with every depression of a key. On release of a key the energy stored in the spring rotates the main spindle. An arm, fixed to the spindle, carries with it a small planet wheel which runs round the toothed orbit on the inside of the storage ring, causing rotation of the planet-wheel about its own spindle. This rotation is imparted to an impulse cam which actuates impulse springs to break the telephone circuit line loop. A small governor mechanism of the usual centrifugal type regulates the speed of the impulse cam.

The impulse mechanism rotates so long as energy is stored in the spring by depression of digit keys. Impulses would be sent continuously during rotation without regard to digit values if the impulse train were not interrupted to ensure that, after sending a number of impulses corresponding to the key depressed, a pause precedes the next digit. The pause is introduced through the medium of the pins projected by the storage mechanism. As the impulse mechanism rotates a small lever sweeps round the storage ring, passing over pins *in situ*, but being operated when a projecting pin is encountered.



The keysender with the cover removed. The impulse mechanism is shown at the point where the lever is acted upon by a projecting pin, the impulse springs being lifted clear of the impulse cam

Operation of the lever lifts the impulse springs clear of the impulse cam to introduce the inter-digit pause. The length of the face in contact with the pin is such that the springs are lifted during rotation for 600 milli-seconds, this being a sufficient time to give circuits at the exchange time to operate before receipt of the next digit.

Method of Use

On being requested to establish a call to the public system the p.b.x. operator depresses the appropriate digit keys as rapidly as she chooses and then proceeds to attend to other calls while the sender impulses over the line to the main exchange. Impulsing on one call must, of course, be complete before another number is keyed, and to safeguard against the sender being prematurely taken into use, a disc, visible through a window in the cover, rotates to provide an indication that the sender is in operation.

Keysending as a means of speeding-up operating procedure is not new, being used in complicated electrical form for inter-exchange calls in London, Birmingham, Manchester, &c. The application of the principle, however, by means of this mechanical sender is of considerable general interest in view of the large number of calls made during business hours through private branch exchanges.

Magnetic Separating Drums. By H. E. Hutter

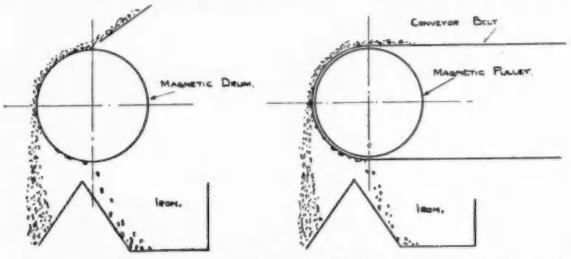
How they differ from pulleys

WHILE in some cases existing conditions will not permit the extra head-room required for a magnetic drum to be installed, the advantages it offers in separating iron particles from granular or powdered products are so great that wherever possible its use is advocated in preference to a pulley.

The method of operating a drum is clearly shown in the diagram. The material is fed on to the face of the drum and passes forward in the same direction as the drum rotates. An even feed is essential, such as the discharge from a conveyor, jigging feeder, or a plain discharge down a chute. The drum rotates at from 30 to 35 r.p.m. and the trajectory of the material will, of course, depend on the peripheral speed of the drum. Magnetic material, whether small iron or heavy tramp iron, is carried round by magnetic attraction past the bottom centre and is automatically discharged by its own weight, or force of gravity, without the aid of cut-offs or mechanical devices.

With the magnetic pulley (the operating principle of which is also shown in the diagram) a chief advantage is that it can be installed in an existing plant by changing over the present head pulley.

The essential difference between a pulley and drum is that in the former the magnet system revolves complete with coils,



A comparison of the operating methods of drum (left) and pulley

and to conduct electricity to the winding a pair of sliprings has to be mounted on the end of the shaft; with the drum the magnets and coils are solidly connected to the shaft, which is clamped in rigid bearings. Around this magnet system revolves a cylindrical drum cover supported on end flanges which run on the shaft. As the magnet does not revolve, the slip-ring gear is not required.

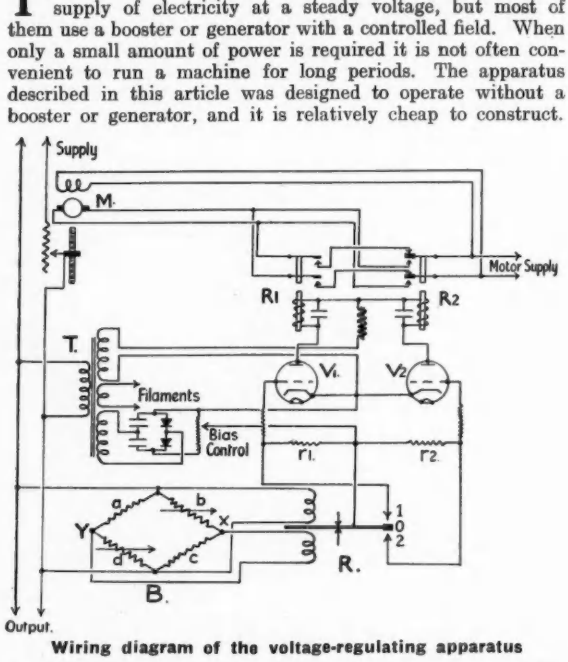
An advantage of the drum is that the material is fed into intimate contact with the bare magnet while, in the case of the pulley, the thickness of the rubber conveyor belt intervenes. The arrangement of the magnet poles in the drum depends on the nature of the material being treated. By arranging the poles parallel with the axis of the shaft the material will pass from alternate north to south poles and the magnetic material will be given a gambolling motion. Poles placed at right angles to the shaft are most suitable where tramp iron is likely to be encountered, as it is never released.

Testing the magnetism of a drum

Claimed to be the largest in the world, drums of the "Biaflux" type recently made by the Rapid Magnetting Machine Co., Ltd., Birmingham, for Tate & Lyle, Ltd., are each 36 in. in diameter and 48 in. long, while the weight of each drum is 3½ tons. They are used in a process for maintaining the purity of sugar. As an example of the magnetic power of the drums, the accompanying illustration shows eight men suspended from a flat bar making convex contact with the drum face. The actual weight of the load shown is 1,230 lb.

Voltage Regulation. By W. D. Martin

THERE are several types of apparatus for providing a supply of electricity at a steady voltage, but most of them use a booster or generator with a controlled field. When only a small amount of power is required it is not often convenient to run a machine for long periods. The apparatus described in this article was designed to operate without a booster or generator, and it is relatively cheap to construct.



Wiring diagram of the voltage-regulating apparatus

Referring to the diagram, B is a four-arm resistance bridge which is connected across the supply to be controlled. The arms *b* and *c* have a zero temperature coefficient and are constructed of "Eureka" wire. The arms *b* and *d* each consist of a Philips "Miniwatt" lamp, which has a large temperature coefficient. R is a relay that was constructed from the motor portion of a supply meter. The current coil was rewound, the damping magnet removed, and a light contact arm mounted on the spindle of the aluminium disc. This relay operates satisfactorily with currents of the order of 1 mA. V1 and V2 are GT.1 gasfilled relays, and the transformer T supplies the filaments, h.v. and grid bias for these two relays. R1 and R2 are two relays that operate the armature circuits of the motor M which drives a variable rheostat through reduction gears.

To operate the apparatus the bridge is balanced for the required pressure. The bias on the two GT.1 relays is adjusted so as just to prevent them from striking.

If the supply pressure were to increase slightly after the adjustments this would cause an increase in current and heating in the arms of the bridge B. The resistances *a* and *c* would remain constant, but the resistances *b* and *d* would alter and throw the bridge out of balance. This would cause a potential difference across *x* and *y* and cause the relay R to close the contacts *l* and *o*. These contacts would short-circuit the biasing resistance *r*1 and cause V1 to strike and operate relay B1, which would close the armature circuit of M and cause M to increase the resistance of the rheostat until the pressure across the bridge fell to its original value.

If the supply pressure were to fall slightly the phase of the potential across *x* and *y* would be reversed and would cause the relay R to close the contacts 0 and 2, short-circuiting *r*2 and causing V2 to strike and operate R2, which would cause the motor M to operate in the reverse direction and decrease the resistance of the rheostat until the pressure reached its original value.

This apparatus has been in constant use for several months in the laboratories of the Electrical Standardising Testing and Training Institution, London, controlling the supply voltage for testing the life of lamps.

Over normal temperature variations the voltage has been controlled within the ±1 per cent. allowed by the British Standard Specification for life tests of lamps, but the limits of control can be made much finer by placing the apparatus in a chamber and controlling the temperature with a lamp and thermostat.

Earth Leakage Potentials. By T. C. Gilbert, A.M.I.E.E.

The prevention of high values by the use of trips

WITH earth leakage trips of the type discussed in the ELECTRICAL REVIEW of February 8th last, earth wires need not be carried back to a rising water main or a large earth electrode. A hot-water radiator in a room may be safely utilised as an earth path; or a gas pipe could be used without hesitation. The steel framework of buildings also provides a useful earth connection, and practical experiments with efficient leakage trips show that they will operate when connected to a large nail driven into a few inches of damp concrete.

In rural areas small earth spikes are quite sufficient, and represent no great cost if provided for every portable appliance on an electrified farm. As tough-rubber wiring systems provide an excellent method of equipping country buildings, the

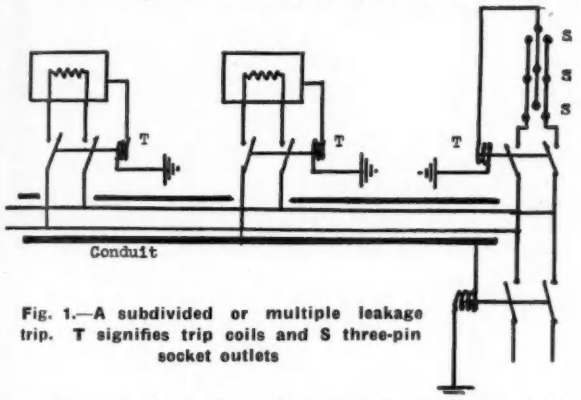


Fig. 1.—A subdivided or multiple leakage trip. T signifies trip coils and S three-pin socket outlets

continuous earth circuit, such as conduit, can be completely eliminated with greatly enhanced protection.

With the arrangement shown in fig. 1, where the individual earth connections are taken to adjacent earths, such as water pipes, and not to the conduit, which is only earthed through the main trip, leakage trips may be said to be truly supplementary to earthing, while the sub-division of protective devices should make for reliability and continuity of service. It is suggested that earth wires could be formed by ordinary p.b.j. conductors, which are cheap, distinctive, and fairly proof against damage from corrosion, while the light insulation is a further advantage, preventing accidental operation of a trip by some extraneous current.

The Mines Report for 1933 reveals that two miners were killed by reason of leakage potentials upon coal cutters that were solidly earthed in accordance with all relevant regulations. It is impossible to prevent the appearance of a potential, possibly of a dangerous value, at the ends of a long earthing conductor when heavy currents are passing, and mining engineers have been lately considering some form of local earth connection. A similar arrangement to that shown in fig. 1 should provide them with a selective leakage protective system when adapted to the special requirements for mining apparatus, but upon this I am not qualified to speak. There appears to be no difficulty, however, in finding suitable positions in the vicinity of controlling circuit breakers for small earthing electrodes underground, whatever the difficulty in providing heavy current earth plates.

Adjustable Tripping Current

One British manufacturer makes the tripping current adjustable between 50 and 20 mA; this is, I think, an excellent point which does not appear, as far as I know, in any Continental switch. The objection will be that a higher cost is incurred by reason of this refinement, and it is not, strictly speaking, necessary.

There are some situations in which earthing conditions are comparatively good, and if dangerous potentials can be avoided by the employment of leakage currents up to even half an ampere, there is really no need to reduce tripping currents to the 30 mA mentioned in the appropriate Regulation. For instance, at the discussion on these points at a recent A.S.E.E. meeting, it was stated that cookers with new hot-plates often passed as much as 30 mA or more to earth until the plates were thoroughly dried out. Such apparatus would not comply with the Electricity Commissioners' Regulations, but an adjustable leakage trip would enable this troublesome period to be passed without unnecessary disconnections from the supply.

It is true that this step would not comply with the I.E.E. Regulations, in which the limit of tripping current is placed at 30 mA. It should be made clear, however, that the secret of effective leakage protection is the elimination of dangerous leakage *potentials*, the size of leakage currents being quite a secondary consideration. In all appropriate Continental regulations operating currents are not even mentioned, stress being placed upon the need to eliminate or limit potentials in consequence of leakage.

Where high earthing resistances are met with, operating currents must be reduced to the lowest practical limit, but there must be many situations in which 50, or even 100 mA, does not represent a dangerous current. To this extent an adjustable trip may possess certain advantages, but any switch incorporating it will have a limited range of application. The immediate need seems to be towards some measure of standardisation. I believe that in future editions of the Wiring Regulations emphasis will be laid upon the necessity of paying greater attention to leakage potentials than to leakage currents, which are of a rather elusive nature, being often spread over a wide area by parallel paths and not necessarily concentrated into one leakage path through the leakage switch.

Rural Transformer Earths

In the Correspondence columns of the ELECTRICAL REVIEW recently an engineer connected with a large Scottish supply authority described a switch that has been evolved by a British manufacturer to meet his difficulty in securing and maintaining adequate transformer earths in rural areas. This was similar in principle and construction to neutral potential switches that have been in use abroad for some considerable period, and described by myself in these columns.

A sketch of a Continental arrangement (makers: Schiele and Bruchsaler Industriewerke A. G. Schwarzwaldbahn) is shown in fig. 2; the main earth connection is still provided, for certain reasons, but an auxiliary earth is placed in parallel. All the time that the main earth functions satisfactorily, without abnormal potential upon the neutral, then no action is required from the potential trip; as soon as any potential in excess of about 40 V appears upon the neutral, then disconnection of the lines takes place. The thermal trip in the neutral line is incorporated for a purpose that is unconnected with neutral potentials.

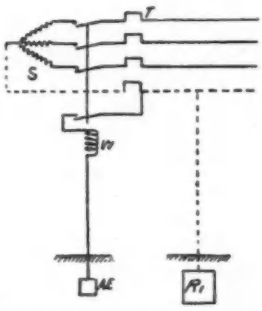


Fig. 2.—Continental arrangement for a sub-station switch. The symbols are: T, thermal releases for overload; W, trip coil; S, transformer secondary; R, main earth; and AE, artificial (auxiliary) earth

The British arrangement (Makers: Messrs. Nalder Bros. and Thompson) shown in fig. 3, is arranged for single-phase three-wire distribution, and the other for three-phase four-wire work, but apart from this, in the Continental switch the auxiliary connection is broken with the lines, although the main earth remains unbroken. In the British switch the auxiliary earth apparently remains unbroken also.

I am informed that the British-made switches are functioning quite satisfactorily, and it would appear to be a debatable

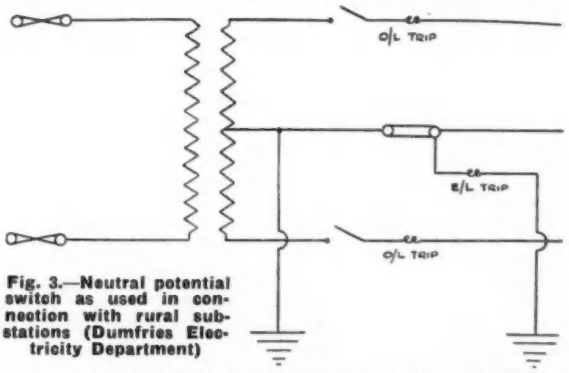


Fig. 3.—Neutral potential switch as used in connection with rural substations (Dumfries Electricity Department)

point as to whether this auxiliary earth should be broken or not. I can understand the idea of the Continental engineer in providing this feature, which is that the transformer and its associated gear is also connected to the neutral earth as well as the neutral line itself. Should a fault take place in the transformer or switch, although the neutral potential release would ensure disconnection of the lines, yet the transformer

or switch remains connected to the neutral earth, and fault current would continue flowing over the parallel earth connections indefinitely. No damage would occur in the case of the main earth, but it would be possible for the trip coil to be damaged. If the fault were on the h.v. side the coil would almost certainly be burnt out, and the trouble would not be apparent when the switch was again put into operation. Naturally, no test keys are incorporated in the sub-station switch, as the disconnection of the neutral cannot be contemplated.

Experience abroad has presumably shown a need for the disconnection of the auxiliary earth, but I have never discussed this with Continental engineers; the placing of a fuse in this auxiliary circuit for protection of the trip coil is unthinkable, and the only way to prevent damage under the conditions I have visualised would be to provide a break in the switch, opening later than, and closing before, the main-line contacts. The further views of the engineers using the switch in Scotland would be welcome in this connection. Perhaps they may be prepared to go to the length of placing artificial earth faults on their transformers with a view to ascertaining the degree of damage possible to the trip coil.

A similar necessity to protect the trip coil does not arise in the case of the ordinary leakage trip, in which in all cases the coil circuit is broken with the opening of the switch. A letter from a correspondent in the ELECTRICAL REVIEW of January 4th visualises a leakage trip as a "delicate" and "sensitive" piece of apparatus, liable to frequent failure. On the contrary, there is no reason whatever why it should not be as robust and reliable as a heavy circuit-breaker.

A case has been advanced for the use of neutral potential switches at all transformer positions in rural areas, the idea being that, with the safe limitation of neutral potential, all consumers' apparatus can be earthed to the neutral line. The case appears extremely weak, as it makes no allowance for a possible neutral disconnection between transformer and consumer, while with long lines the existence of unbalanced loads will present the consumer with a potential instead of protecting him against one. Sub-station switches must be used in conjunction with consumers' leakage trips, and as the engineers who have been successfully using the former point out, they can always be adjusted to give discrimination between the consumers' and the main circuit switch.

If anything is to be eliminated in the sacred name of economy in connection with rural distribution, it should certainly not be the consumer's leakage trip; the standardisation and cheapening of British-made switches should have the very opposite effect, namely, that of multiplying the number in use, even on each individual installation. Home-produced leakage trips are already available at the modest price of 8s. 6d. each with the present limited demand, indicating that the obstacle of cost will soon be surmounted.

Small Joints. By H. R. Taunton

THIS is not going to be one of those orthodox essays on "Joints and How to Make Them" which occupy so disproportionate a space in even the most modern text-books on wiring; but, rather, the voicing of a heresy.

I had occasion recently to inspect and report on the electrical installation of a cinema, in which a couple of "dry" joints were found; and I held up my horrified hands as high as anyone. These joints were properly "married" by all the lore of the technical schools; they were correctly and carefully insulated; and their one lapse from electrical virtue was that they were not soldered. And, when I had got over the first shock, I asked myself, "Why should they be?"

Why should they be? In the very old days, when flex was joined direct to cable it, too, had to be soldered. The rules now expressly forbid the soldering of flex; joints between it and cable must be made in a mechanical connector. Experience had shown that the fine strands of flex and its comparatively light insulation were injured by the heat of soldering. Is it not obvious that the same ill effects must be suffered in a less degree, by the small wires and insulation of cables? (We are only talking about the sizes used in ordinary circuit wiring: say, from 7/.036 downwards.) And if those ill effects are admitted, what are the mechanical and electrical advantages of soldering which are supposed to compensate for them?

The alternative to a soldered joint allowed by the rules, and indeed almost invariably employed nowadays, is a coupling of the wires or cables in a mechanical connector. The commonest type used in wiring consists of a short brass sleeve with a couple of pinching screws, mounted loosely in a small moulded porcelain block. A through or tee joint in, say, a run of 3/.029 is made by baring back the braid and insulation, twisting the wires loosely together, inserting them in the brass sleeve and pinching them in it by means of the screws. Well, what is that in essence but a "dry"—unsoldered—joint? What are the joints in connector boxes, and, in fact, the loops in switches and ceiling-roses, but "dry" joints? And they are "dry" joints less satisfactory, both mechanically and electrically, than an unsoldered hand-made joint, properly insulated; whether it be a married joint or even a properly twisted joint in single wires.

Strength and Flexibility

Mechanically, a married joint is as strong as the original cable, before soldering reduces its flexibility and impairs the character of the copper on each side of it. No force which would not break the original wire will break the joint asunder. This certainly cannot be said of the mechanical joint made in the standard "midget" connector, or in one of the small "thimble" connectors now commonly used, in which the wires are simply held by being twisted together in its shaped interior. And similarly no great force is usually needed to drag the conductors from the terminals of a switch or ceiling-rose, unless the screws are abnormally tightened. If they are, the copper is flattened and scarred—a thing not possible in a hand-made joint—and if the wires cannot be pulled out they are the more likely to fracture where the screw pinches.

It cannot be, then, that the soldering of a joint is thought to be essential to its mechanical strength. Is it, at least, justified electrically? The idea behind it is, that it ensures intimate and permanent electrical contact between the wires. Yet it is not considered necessary, to ensure the same result, in a mechanical connector. In a married or properly twisted joint the cables or wires are in intimate contact throughout the whole length of the joint: long line contacts amounting to a definite area.

In a mechanical connector they are only in loose contact where they are twisted together as they enter the sleeve—there is, in fact, no obligation to twist them at all—and they are only in intimate contact at the point where they are pressed together by the pinching screws. That contact may actually be no more than equivalent to the area of the point of the screw, though the wires themselves may be a couple of 7/.036's. Clearly, so far as original good contact is concerned, the hand-made joint is the better.

Soldering is supposed, presumably, to make that good contact permanent, preventing any tendency for the wires to work loose from each other, and excluding air, which in time would oxidise the metal or corrode it. In either case conductivity at the joint would be lessened and abnormal heating set up. There is no reason to suppose that a joint left undisturbed—and a joint is never disturbed except of set purpose—need ever become less tight than it was made. It is insulated from vibration by a cushion of rubber, and its size and area of contact are too large to respond to normal temperature variations.

Working Loose

In a mechanical joint, on the other hand, the efficiency of which depends entirely on its small screws set in rigid material, vibration and alternate expansion and contraction of the metal may easily—and in practice do—result in loose connections and over-heating. Moreover, they are fully exposed to the air, and there is nothing to prevent any oxidising or corrosive action of it on the surfaces of the wires, with whatever ill effects may follow. The hand-made joint, however, is fully protected from these ill effects by its insulation. Properly made, with para strip and black tape, this is as airtight as any soldering could make it.

Nothing that has been said here applies, of course, to butt or sleeve joints in large cables. With them the case is altered, and soldering is obviously the only practical way of making good connections in them. It is, perhaps, because large cables must be jointed with solder, that, without thought, the same necessity has been assumed for the smallest sizes. But, to repeat the original question: Is there any real necessity for the soldering of hand-made joints in small wiring conductors—particularly since it is agreed there is no necessity for it in mechanical joints?

I shall still, however, continue to condemn any "dry" joint I may find in an installation, not only because it is a breach of a definite wiring rule, but because I never hold an unusual opinion so fanatically as not to admit the suggestion that the views of the majority may be right. At the same time, in this particular matter of small joints, I should be interested to learn on what reasoning the opinion of the majority is based; whether there is anyone—which is doubtful—who has given so trifling a question the scientific analysis it hardly deserves.

Diesel-electric Thames Tug

ON three days this week the Diesel-electric tug *Framfield*, which has been built by Messrs. J. I. Thornycroft & Co., Ltd., for the Thames Steam Tug & Lighterage Co., Ltd., made demonstration runs between the Tower and Woolwich piers on the River Thames.

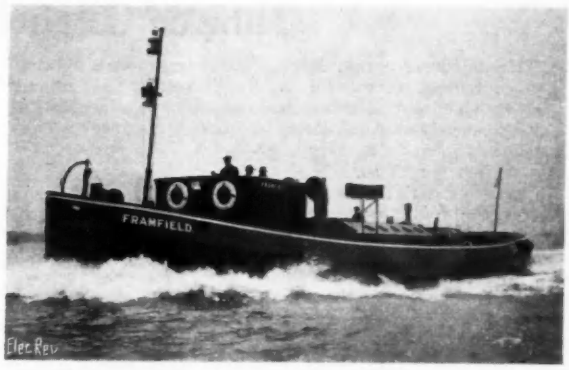
This vessel is 77 ft. 6 in. long with a breadth of 19 ft. 6 in. and a depth of 10 ft. 4.5 in., her draught being 10 ft. An unusual feature is that the Diesel engines and the electrical equipment have been built by the same company, namely, the English Electric Co., Ltd., which claims the following advantages for this class of vessel: the propeller speed is designed to suit towing conditions, giving increased tow-rope pull per b.h.p.; direct wheel-house control and reduced operating staff; while reliability is enhanced and maintenance costs are reduced because the engines are not subjected to overloads and arduous operating conditions.

The two main Diesel engines are of the six-cylinder four-stroke "K" type, each capable of a continuous output of 265 b.h.p. at 530 r.p.m. They are of monobloc construction and are completely enclosed. Mechanical fuel injection is provided, with individual pumps and injectors for each cylinder. Forced lubrication is employed throughout. The fuel and lubricating oil filters are of the dual type and can be cleaned while the engines are running. The oil supply, which is self-contained, is located in the sumps provided in the engine base-plates, the oil cooler being easily accessible for cleaning purposes. Special provision is made for washing out the cylinder jackets with water at high pressure, and large inspection doors are fitted to the cylinder heads. The bilge and circulating pumps, of the plunger type, are fitted at the front end of each engine and are driven at one-third of the crankshaft speed.

The main control board

The main 168-kW, 350-V d.c. generators are directly coupled to their respective engines. They have rotatable magnet frames, and their shafts are extended to carry the armatures of the overhung-type auxiliary generators, which have outputs of 25 kW at 110 V. All the generators are canopy protected, self-ventilated and specially insulated for marine service. The propulsion motor is of the double-armature forced ventilated type, and is capable of developing 400 s.h.p. at any speed between 100 and 140 r.p.m.

The Michell thrust-block and the aft bearing of the motor are combined, and the forward end of the shaft is extended to provide the drive for the revolution indicator. The magnet frames can be rotated in their cradles to simplify inspection. The main bearings of the generators and motor, with the exception of the thrust-block bearing, incorporate a special method of disc lubrication.



The main control board is of the "dead front" type, and is completely enclosed. The various controls are interlocked in order to prevent incorrect operation, and each is clearly marked to indicate its particular function. Either engine room or direct bridge control can be employed, the change-over switch being situated on the main panel and provided with a lock to prevent accidental movement.

The control of the propulsion equipment is carried out on the Ward-Leonard principle, which gives smooth acceleration at all speeds, together with simple and economic operation. The special feature of the design of the control equipment is that it is impossible to overload the engines. After the engines have been started and run up to speed, and the control taken over on the bridge, no further adjustments are necessary in the engine room. This system requires no auxiliary motor-generator set, nor any contactors or other delicate apparatus.

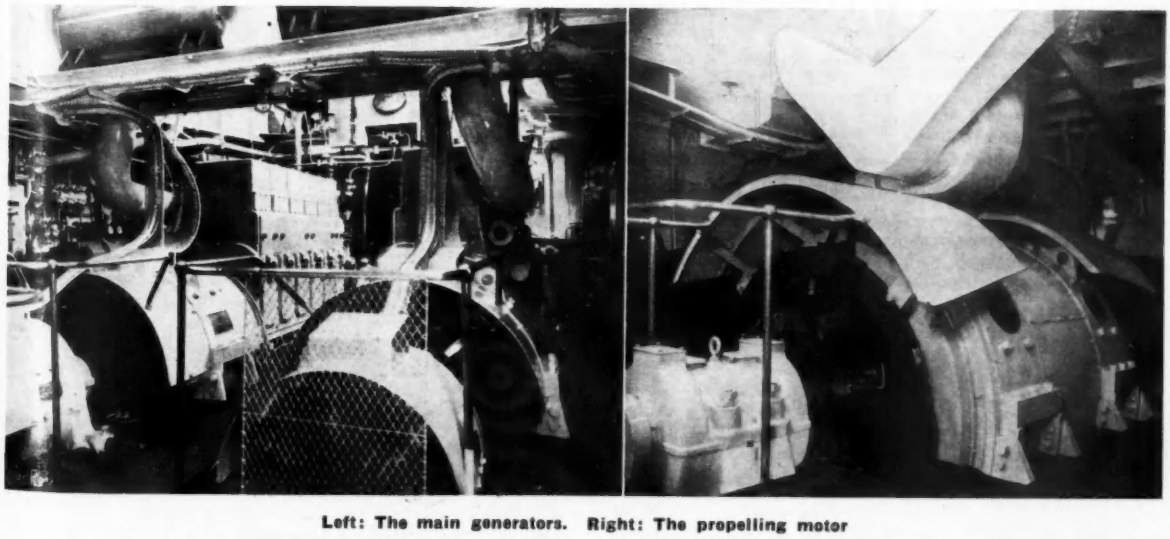
Provision is made to enable the tug to operate with either one or two engines running. It is also possible to run at half power with either half of the propulsion motor out of service. The safeguards incorporated in the control system are such that damage to the equipment is prevented, even when incorrect operation is attempted.

Auxiliary Equipment

A 5-kW 110-V d.c. generator, directly coupled to a 10-h.p. "Petter" auxiliary oil engine, acts as a stand-by set, and provides the power for the general services when the main generators are not running. The shaft at the commutator end of the generator is extended to carry a clutch through which a Reavell air-compressor can be driven for charging the starting air bottles for the main engines. The auxiliary switchboard is equipped with change-over switches, thus enabling the power supply to be taken from either of the auxiliary generators driven by the main engines or from the stand-by set. The auxiliaries, all of which are electrically driven, include fuel-transfer and general service "Drysdale" pumps. The electric steering gear fitted was made by Thos. Reid. Electric lighting, including the navigation lights, is provided.

Accommodation is provided for the officers forward, and for the crew aft, of the machinery space. The usual necessity for lowering a funnel at low bridges is avoided by omitting the funnel and carrying the engine exhausts through the engine room ventilators.

The wheel house and the forward cabin are electrically heated and Siemens cables are employed in the vessel.



Left: The main generators. Right: The propelling motor

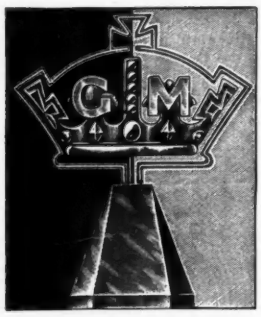
Jubilee Lighting Equipment

THE following notes relate to special or standard lighting equipment suitable for the King's Jubilee Celebrations to which our attention has been drawn, or which has been introduced, since the review of the subject in the ELECTRICAL REVIEW of February 15th.

In some quarters favour is shown towards the multiple-type of sign incorporating such units as crowns, wreaths and letters usually linked up with garlands. A typical design introduced by the Franco-British Electrical Co., Ltd., is a painted cartouche in relief 54 in. high incorporating cut-out painted letters, and wired and fitted with pigmy lamps. The lions' heads are outlined with lamps and connected by lamp studded garlands with rosettes and ribbons.

"Efesca" decorative unit

Incorporated in similar designs produced by Messrs. Falk, Stadelmann & Co., Ltd., are laminated papier mâché shrubs and trees. But such units are available separately, and our selected illustration is a shrub design in deep relief painted in natural colours. It is particularly suitable for decorating balconies and is wired complete with b.c. lampholders.



Wholesale Fittings neon window display unit

Included in a range of devices and equipment listed in a special Jubilee folder issued by the Sun Electrical Co., Ltd., is the "Rising Sun," an effective design of all-metal construction arranged for 61 s.b.c. coloured sign lamps. It is 4 ft. in diameter and is supplied complete with a new type of motor-driven flasher.

There is increasing evidence of the flexibility of neon, and the "Alto" window display set introduced by the Wholesale Fittings Co., Ltd., is a further example of the self-contained unit. It has a crown neon outline and an inset cellulose gold sprayed design with letters in blue. The unit is interchangeable with twenty other designs. Another self-contained neon display unit is the "Ionlite" green and blue monogram "G.M." with a decorated card background mounted on a cellulose sprayed base. Neon display units produced by Siemens Electric Lamps & Supplies, Ltd., are self-contained in single-sided 3 ft. by 2 ft. painted boxes for flat wall fixing. The neon tube is superimposed.

Ionlite monogram outfit

Messrs. Hailwood & Ackroyd, Ltd., have put forward the idea of using decorated globes on street lighting standards, newel posts and outdoor signs, and for this purpose they have a range of globes available with decorations in brilliant colours, which are also attractive by day.

A Hailwood & Ackroyd globe

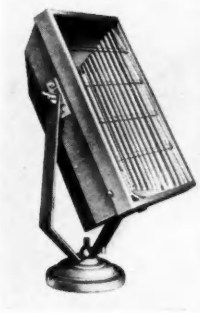
The three-colour "Duo-Chrome" trough, a production of Holophane, Ltd., can be suitably modified for use after the celebrations. A stencil on the top curved panel can have a red crown with blue letters, or *vice versa*, and "Jubilee 1935" can be in any contrasting colour. The stencils can be removed and replaced by other wording.

There is little doubt that tubular lighting will prove a popular form of decoration, and the British Thomson-Houston Co., Ltd., draws our attention to the new "Mazda" light tubes which have a central filament running from end to end. This makes it possible, whatever the length or shape of the tube, to form a continuous line of perfectly diffused and low-intensity light.

Increased thought is being given to the possibilities of floodlighting for the celebrations, and Mr. Winstanley, of the General Electric Co., Ltd., said recently that a very serious effort was being made to take advantage of the opportunity to establish permanent floodlighting installations.

Holophane "Duo-Chrome" trough

From the wide range of "Efesca" floodlighting equipment we select for attention the square front "Baby" spot light because it is suggested that it is suitable for mounting in trees. It is made of lead-coated steel, cellulose finished, and is supplied with an adjustable cradle with locking nuts and a bolt and wing nut. The front is 7 in. square, and the overall length and height are each 12 in. A clear or coloured glass screen is provided. Among the "Franco" projectors is the type "C" reflector for short-range work. The simple spun case carries a b.c. lampholder for a 100-, 150- or 200-W lamp, and the fitting has a light projecting bracket.



The "Sieray" floodlight

We hear of further special arrangements which have been made for hiring out projectors during the celebrations, and except for the "Sieray" gas-discharge lamp equipment, any of the projectors shown in the Siemens Jubilee catalogue may be hired at half the listed price for a period of four weeks. The "Sieray" projectors are supplied in two types: concentrating, for a rectangular beam in the vertical plane for such structures as towers and war memorials, and dispersive for wide-angle work for flooding large surfaces. The London Electric Firm is offering at favourable terms for purchase or hire for Jubilee work a large number of war-time searchlights which it has purchased.

There will also be a demand for characteristic indoor lighting equipment. Furn-Art, Ltd., have produced a comprehensive range of imitation vellum or Egyptian cotton shades incorporating Jubilee lettering and designs, while a typical Jubilee table lamp introduced by Messrs. Charles Selz has a flaky vellum shade with a hand-painted crown and is sold complete with a wooden stand.

Vellum shaded table lamp (Charles Selz)

A Furn-Art shade

Special arrangements are being made to meet demands for large quantities of lamps, and Century Lamps (London), Ltd., state that their clear and colour-sprayed "Daystar" lamps are suitable for the illuminations. The company also provides strip-lighting material.

Electrical Development

The report of the E.D.A. Council for the past year

THE report of the Council of the British Electrical Development Association for the year ended December 31st last covers the first complete year's working since the Association's reconstitution in 1933, and it is stated that marked progress in all branches of its activities has been made possible by the substantially increased income.

Bye-laws governing the constitution and operation of Area Committees have been approved by the Council, and two Co-operation Committees have been established to maintain contact with the manufacturers, and contractors and wholesalers. The first consists of representatives of the B.E.A.M.A. (3), the C.M.A. (2), and E.L.M.A. (2), with four members of the E.D.A. Council, the Executive Chairman and the Director. The other committee comprises representatives of the E.C.A. (3), the E.C.A. of Scotland (2), and the E.W.F. (2), with six members of the E.D.A. Council, the Executive Chairman, and the Director.

Thirty-six new members were enrolled during the year and forty-five undertakings formerly subscribing at less than the full rate became members in accordance with the provisions of the revised articles of association. The total contributions from supply undertakings amounted to £85,970, including £42,261 from the Central Electricity Board. This compares with £57,506 from the supply section and £6,420 from other sections (total £63,926) in 1933.

The receipts are analysed as follows:—Central Board £42,261, Joint Electricity Authorities £482, local authorities (including joint boards) £31,392, London companies £3,193, power companies £3,898, provincial companies £3,893, Dominion and foreign undertakings £395, donations £456. The analysis of expenditure shows that 71.0 per cent. was devoted to advertising, publicity and similar purposes, including the production of the E.D.A. films. The area committees account for 7.3 per cent. and salaries and wages for 11.8 per cent.

From February to July a Press advertising campaign stressing cooking and water heating was carried out at a cost of £25,000. As a result of this 10,000 inquiries were received—the largest from any single E.D.A. campaign. A comparatively inexpensive, but none the less important campaign, was conducted in selected trade and professional journals appealing particularly to architects, builders, estate agents, doctors, borough engineers and surveyors, farmers and hairdressers. Two special architectural supplements were also prepared and circulated.

The Films

The report gives some details of the three films which were made during the year, and states that although the films were not ready for circulation before the beginning of December orders were received from fifty-two undertakings before the end of the month for showing to a total of 2,201 "existing" audiences and a large number of invited audiences. The total number of performances booked to date is put at 3,300.

Reference is made to the various services which the Association renders to its members, including advice and assistance in the erection or reconstruction of showrooms, and the arranging of local advertising and window displays. The two processional cars produced for the 1934 season visited the areas of forty members and in a number of instances won medals and prizes. Photographs and designs for decorated cars were also supplied to members.

There were between three and four hundred entries for a poster competition. The first and second prizes were combined and divided between the best two designs. The revenue from the sale of publicity matter was over £11,000; twenty-four new publications were added to the list. The second public-speaking competition is stated to have been even more successful than the first.

The "E.D.A. Bulletin" and the "Trolley Bus Gazette" continued to be published during the year and a gratifying increase is recorded in the interest displayed by the newspaper and magazine Press in electrical matters, even during the latter half of the year when the Association was not carrying on a general Press advertising campaign. An electrical news service was inaugurated.

Lectures have been given to many types of audiences in all parts of the country. The 156 lectures attracted audiences totalling between 12,000 and 13,000 and they also had a good "press."

The Exhibition Committee's principal activities during the year are reviewed.

The Association has appointed two additional representatives to the Building Centre Electrical Section Committee and fifteen additional electrical manufacturers have acquired space for exhibits at the Centre.

The activities of the Association's committees on special subjects are briefly reviewed, and appended to the main report are the reports of the E.A.W. and of the Area Committees.

The Annual Luncheon

The annual luncheon was held at the Savoy Hotel, London, on March 15th. The President, Alderman Sir Percival Bower, was in the chair, and the guest of honour was Mr. L. Hore-Belisha, Minister of Transport.

Proposing the toast of the Association, Mr. Hore-Belisha said that the prospects before the industry were illimitable and it was for the industry to derive the maximum advantage from them and to remove every possible obstacle in the way of prosperity. The chief obstacle seemed to him to be the absence of a uniform basis of charges, and whilst he did not suggest it was possible to achieve complete uniformity in this matter, the industry should try and make some approximation towards it. The National Convention at Bournemouth ought to be the greatest publicity opportunity the industry had ever had.

[*Press Portrait Bureau*
Viscount Falmouth

The President, in responding, said that the reconstituted E.D.A. could be said to have fully justified itself. The film campaign was an epoch-making event and it would be backed up by an intensive Press campaign. There was a general feeling among the public in the case of well advertised commodities of popular use that the cost of the article was increased to the extent of the cost of the advertising, but in the case of electricity quite the contrary was the case because the more electricity was advertised and the more it was used the lower became the cost. In conclusion, the President expressed appreciation of the work done by the staff during the past year and congratulated the Association on the fact that Lord Falmouth had consented to become President for the coming year.

Sir William Ray (Executive Chairman) said he desired to thank all those associated with him for their valuable work. He pleaded with those supply authorities who were not yet members to come into the Association not only for the benefits which they would receive by so doing but also because it was felt that so soon as E.D.A. represented 100 per cent. of the industry it would be able to talk with a much more authoritative voice.

Annual General Meeting

At the subsequent general meeting there was a fair amount of criticism, which was welcomed by the President. Finance was the first item dealt with and Mr. R. S. Downe (chairman of the Council), who presented the accounts, said that the Central Electricity Board was contributing £1 for £1 with all the supply authorities.

Mr. Blakiston (Ipswich) pointed out that whereas the local authorities, including Joint Boards, had subscribed £31,392, the London companies, the power companies and the provincial companies had subscribed together less than £11,000—a "disgraceful" subscription, having regard to the relative magnitudes of the power companies and the municipalities. He suggested that, as the manufacturers had been expelled from the Association a year ago because they did not subscribe adequately, the Association might do the same with the power companies.

In reply to this, the President suggested that Mr. Blakiston had unconsciously lost touch with the actualities of the situation. He did not like the use of the word "expelled"; reasons had been adduced as to why the manufacturers should not continue to take part in the activities of the Council of E.D.A., and a mutual arrangement was arrived at. However, he hoped that the power companies might see the wisdom of extending their support of the work.

Gratification was expressed by Mr. R. S. Downe when he presented the report for the year, that the Association's revenue in 1934 was nearly 100 per cent. above the amount received before reconstitution. He also commented upon the satisfactory increase in the number of members.

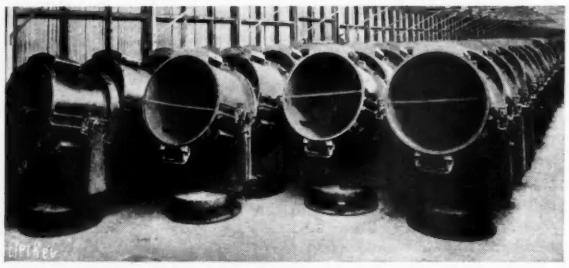
(*Continued at foot of next page*)

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Airway and Aerodrome Lighting

IN his paper on "Recent Developments in the Lighting of Airways and Aerodromes" read at a London meeting of the ILLUMINATING ENGINEERING SOCIETY on March 12th, Mr. H. N. Green stated that it was more difficult to state the requirements of lighting than to build apparatus to meet the requirements. His paper was mainly devoted to a description of recent developments, starting with a brief review of the visibility of light signals and covering threshold illumination, the practical



A battery of ex-Service searchlights which are being supplied by the London Electric Firm for the Jubilee illuminations. **(See page 414)**

threshold for recognition of a signal, foveal and paraveal vision, and the effects of background brightness as well as those of flashing character.

After explaining the principle of spacing airway beacons along a route the author showed that low-power beacons close together marked a route less effectively than higher power beacons placed relatively far apart. British practice was compared with that abroad, and it was shown that we allowed much more light for bad weather conditions and inclined to lower beam intensities and rapid signal repetition. The advantages of beacons giving over a million candles in the main beam were questioned and the performance of such beacons in bad visibility conditions was analysed.

The latest design of beacon installed on the Croydon-Lympne airway was described by the author. In this, he said, two beams of light were emitted and two separate lenses were used to produce each beam, the inner lenses controlling the horizontal divergence, while the outer lenses gave the required vertical distribution. By this arrangement the resultant beam had the same horizontal divergence at all angles of elevation, and consequently the duration of the flash exhibited was the same for any direction of observation. An oscillating beacon which exhibited a definite "on course" signal was also described. Although neon light was still used for aerodrome beacons the author maintained that it had no special fog penetrating qualities. It was scattered and absorbed by the atmosphere in just the same way as any other red light and, with visibility down to a mile or less, a neon light could not be seen appreciably further than a white light of equal intensity.

Blind flying might necessitate the use of a more powerful aerodrome beacon than the neon type in the future. A pilot coming out of the clouds, somewhere in the vicinity of the aerodrome and with ground visibility poor, had no idea of the direction in which to look for the beacon, which must be picked out from other red signs by its flash period. It was, therefore, possible that a light which was recognisible by virtue of both intensity and character might in time become preferable to one recognisable by character alone. Of floodlighting methods for aerodromes for night landings, the best and most convenient (and, incidentally, the most expensive) was to install a number of fixed floodlights at intervals round the aerodrome boundary. One or more floodlights could be turned on, according to the direction of the wind, and as the whole installation could be remotely controlled, there need be no delay in bringing the lighting into action or following changes in wind direction.

The author described some interesting floodlighting developments in Germany and Holland, dioptric floodlighting with lamps with filaments shaped to increase the maximum luminous intensity and reduce the foreground illumination. Figures were given showing the improvement in floodlighting performance during recent years. The latest designs of boundary lights used in Great Britain and Germany were described, and the use of sodium tubes in Holland and the light distribution of obstruction and boundary lights were referred to.

The Modern Power Station

THE trend of modern power station design is considered in the paper by Mr. A. E. Farmer that was read before the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on March 11th.

Nowadays, says the author, the aim is not so much to produce a cheaper machine as to secure foremost place in efficiency returns. This desire has influenced many designers, since improvement in coal consumption will increase efficiency but not necessarily reduce the cost of the set.

The general arrangement of a power station has scarcely altered, but a technical analysis of entropy diagrams shows how increased steam pressure can improve efficiency. Elevated steam temperature in conjunction with greater pressure is the source of all difficulties in design. To keep dimensions within reasonable limits special steels have to be used which cost more to produce.

An attempt is made to demonstrate pictorially the principle involved in the important changes that have taken place in boiler feed-water heating, and to show that the more steam that can be bled from a turbine the greater will be the saving from the condenser.

Little further improvement in lowering the temperature of the flue gases is anticipated. The use of pulverised coal has greatly altered steam boiler design, and materially improved the combustion heat efficiency. There is better control of the fuel-air mixture and the losses through flue gases and unburned carbon in the ash are reduced.

The efficiency suffers, however, by reason of the power required by the auxiliaries. In the case of a modern stoker fired unit this may be in the region of 2 per cent., but with the necessity of drying and pulverising the fuel the figure rises to about 3.5 per cent. of the total heat in the steam.

Electrical Development *(continued from previous page)*

With regard to national advertising, from January until July, E.D.A. advertisements had appeared continuously in the national dailies, the picture papers, sixty large-circulation provincial papers, and six class journals. It was estimated that these advertisements reached a circulation figure of 400,000,000. The fact that 10,000 written enquiries were received at headquarters from the public was evidence of efficient advertising.

Towards the end of the year under review another national advertising campaign was started, in which the Association was still engaged. That campaign comprised a series of very important announcements in journals reaching, he believed, practically every doctor, nurse, architect, builder, estate agent, farmer and poultry farmer in the land. The campaign might not be very spectacular, but it was carrying electrical penetration to very important sections of the community. The results of the showing of the films had fully reached expectations.

Mr. C. D. Taite, seconding the motion for the adoption of the report, was gratified that although the manufacturers were no longer members of the Association they allowed their experts to remain members of the special committees, to the great benefit of the Association and of the industry as a whole. During the year the Committees had produced some very excellent brochures on special subjects. One, which was not mentioned in the report because it was not issued until January last, dealt with the textile industry.

In response to a question Sir William Ray said that, generally speaking, there was satisfaction with the films all round, but at the moment there was no suggestion before the Council for another film of that type. He had discussed with film organisations the production of films which could be exhibited within a period of three or five minutes at ordinary cinemas; but the problem was being considered before the Council ventured to bring it forward.

The annual report was adopted and Viscount Falmouth formally took office as President for 1936-36. Lord Barnby had been appointed a vice-president.

The articles of association were amended by a resolution passed at an extraordinary general meeting, the main purpose of which was to introduce greater flexibility into the system of representation of members.

Consequently the combustion heat efficiencies of 82 and 85 per cent. for stoker and pulverised fuel fired boilers respectively are reduced to 80 and 81.5 per cent. overall thermal efficiencies. If thermal figures alone are considered, it pays to install pulverised fuel fired boilers, but flue gas cleaning plant is costly and unnecessary with stoker-fired boilers. All things considered, the case for powdered fuel does not appear to be overwhelmingly strong.

Generating direct at high voltage improves the alternator and transmission efficiency to the extent of 1 per cent. The machine is more expensive, but the elimination of the cost of the transformer and all its incidentals between the generator and bus-bars, together with the capitalised value of its losses, make the arrangement an economical one.

Members' Views

In opening the discussion, Mr. E. H. Lowden, chairman, remarked that automatic control was making considerable progress and undoubtedly would save a great deal of labour.

Mr. L. Morton said that whereas a few years ago there had been a tendency to adopt boilers having a capacity of 500,000 to 600,000 lb. per hour, and even 1,000,000 lb. had been talked of, recent specifications seemed to be keeping well below the 250,000 lb. mark. In the past most of the temperature troubles had been due to uneven conditions on the furnace side of the superheater and also to the velocity of the steam through the superheater not being high enough. The critical point of metals did not matter so long as it was possible to keep within the danger margin, and from that point of view temperatures of 900 or 1,000 deg. F. might be looked at reasonably by engineers.

Mr. E. F. Hall suggested that steam-to-steam reheaters for resuperheating had a much bigger future than the author had indicated. There was a need for means for controlling the final temperature that did not involve the use of a very much larger superheater than was otherwise needed. The feed heating system was becoming more complicated and more difficult to understand. Mr. Hall spoke favourably of electrical precipitation of flue gases, which, with powdered fuel firing, he said, gave an efficiency of 92 per cent. These plants were coming down rapidly in price and the real question was whether there was sufficient space to accommodate them.

The author said that economics governed the size of boilers very largely and it was not at all improbable that efficiency would have to be sacrificed to some extent and smaller capacity boilers used owing to the high price of the steels necessary for very large capacity high-pressure, high-temperature boilers Stoker firing with economisers had been reverted to at the Hams Hall power station. Economisers seemed to be coming back again to assist in supplying air to the stokers at a more suitable temperature. With pulverised fuel that did not matter. He had seen automatic control act well for quite a long time, but he would hardly like to trust it in a large power station. Steam-to-steam superheating had been tried at North Tees, but had been given up, and designers now tended to think that the better method was to get back to the boiler.

Mr. A. G. Bugden stated that he had recently seen a turbine which had been manufactured for a pressure of about 1,800 lb. per sq. in. and 932 deg. F., in which the flanges of the high-pressure end were 11 in. thick and the diameter of the bolts was 6 in. The nearest approach to a continuous steam main between the steam boiler and the turbine would be a welded main.

Mr. A. E. Carr said that the designer did not appear to appreciate that there were a number of small items which tended to economy in the ordinary power station which did not apply to the base-load station.

The Engineer Administrator

THE paper in which Mr. E. S. Byng maintains that the curriculum of the electrical engineer should include specific training in the subject termed industrial administration, to which reference was made last week, was discussed at the Institution of Electrical Engineers in London on March 14th.

Sir Donald Banks cordially endorsed all that the author had said. The terms "administration" and "executive" had different meanings at home and in America. Administration meant something more than the co-ordination of specialists; it included planning, organisation, co-ordination, control and command. Military organisation was illuminating in this respect, for generals graduated from all branches of the service, showing that specialists of every kind were needed. The accountancy and secretarial departments should not be excluded as breeding grounds for administrators.

Lieut.-Col. A. G. Lee did not like the term administrator-engineer, which was a hybrid and, as such, caused doubt about which element predominated. Administration had come to mean government (of a country or department of State), whereas a business needed to be *managed*. Colleges should endeavour to give technical students a wider view of life and those affairs about which administrators needed to know. While engineers could assess facts, administrators had to assess human factors, and must therefore possess initiative, judgment and energy to make them "good thinkers."

Mr. F. E. Robinson remarked that while the Institutions of Mechanical and Electrical Engineers had a common examination course syllabus, unfortunately their titles differed, which misled students as to the teaching of fundamentals and their application. It should be appreciated that the Institution of Mechanical Engineers had not introduced a new subject but had rearranged its syllabus in 1934 after ten years' experience. The arrangement by which students could return to college to study problems presented by industry had proved to be very useful.

Mr. G. F. O'Riordan said that student members of the professional institutions need have no fears. Facilities for study did exist, but the question was how much should be thrust upon them? At first they should learn the fundamentals of technology and not spend too much time on administration until later when they had had some works experience.

Learning Too Much

Mr. B. O. Anson considered that engineering students were generally over-educated; half the knowledge which they obtained at college was never used in after life, so that there would seem to be room for grafting on other subjects. It was most important to develop the imaginative and calculating faculties. There was a wealth of information in biographies and foreign travel, which helped the student to appreciate how similar problems had been dealt with by others in the past. Man should be able to get some fun out of life, otherwise his education would be thrown away.

Mr. H. E. Morrish thought that the major problem to-day was not to produce, but to sell things. The men who made big incomes were travellers and salesmen, not inventors or producers. Administration was superfine organisation, for which engineering was the best training ground. Changes and reorganisation now taking place in the G.P.O. would, it was hoped, remove existing barriers between engineers and administrators. The I.E.E. should endeavour to be of more service

Some of the members and guests at last week's E.D.A. luncheon. **(See page 415)**

to its members; some safeguards were required as it would be useless to train students if there were no posts for them.

Mr. C. H. D. Lang pointed out that this subject was coming to the fore because of the great changes that were taking place in industry generally, not alone in electrical circles. Amalgamations were causing chief engineers to cease to be producers; they now had to purchase in bulk and re-sell the commodity, so that the heads of such concerns no longer needed to be engineers. It would be useless to train students if there were no openings for them. The I.E.E. should try to guide and direct young men who were launching out.

Mr. F. Gill suggested that the matter resolved itself into the following questions: Was the engineer suitable for administration? The answer seemed to be Yes. Was he the only suitable type? If so, what was he going to do about it? The onus was on engineers to fit themselves for administrative posts. Could all the requisite training be given to men while they were young? Some form of continuation or refresher schools would become necessary. Part only of the training could be given in schools; good judgment and similar qualifications could not be acquired in this way.

Contempt of Economics

Mr. L. Dunbar considered that there was a definite danger of engineers losing ground. They seemed to be above discussing economics and commercial aspects; they often considered any other subject but pure technics to be outside their scope, or so easy as to be automatically assimilated. The I.E.E. should educate its young men up to the importance of this subject, and also induce executives to open out avenues for the younger men. Universities should divide their courses in two, one teaching pure technics as at present and the other offering a much wider scope.

Mr. A. N. D. Kerr said that a post-graduate course after two or three years' business experience would be most valuable. By then the young man would have reached an age at which he could better appreciate things. But at present it was almost impossible to obtain leave from work to acquire such further training. It was not being made easy for the younger men to fit themselves for straightening out what their elders had done. While everyone was stressing sales experience, it was a definite bar to young engineers in the I.E.E.

Dr. W. M. Thornton, president, suggested that it was incorrect to assume that the faculty of leadership was not developed at college, for it made itself apparent in games organisations and similar activities. He had studied economics for two years when a student, but it was not the same thing as that needed to-day. The present requirement was not for political economy so much as organised common sense.

Mr. E. S. Byng, in reply, stated that the danger was that the engineer's view was becoming so narrow that he was unable to see on either side. Very little movement of the blinkers would enable him to look right over the fence. He agreed with Sir Donald Banks that if the student did not know how to "open the windows of his mind" he would labour under a great handicap. If a manager was not appreciative of human nature he would not be a good leader. That little extra training early in life would be useful somewhere and sometime, even if he did not wish to pursue the subject to any length. The man who did not understand the problems of others was in danger of belittling them instead of helping to solve them.

Deposits on Insulators

THE behaviour of overhead transmission line insulators when deposits, industrial dirt and saline, form on them is discussed in the paper by Messrs. W. J. John and F. M. Sayers that was read before the Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on March 20th.

The authors' procedure is to give examples, from practice, of insulator troubles due to deposits and then to discuss, first, the mechanism of insulator failures, and, secondly, insulator designs to overcome or alleviate the troubles.

In Part I an account is given of two 33-kV lines insulated with cap-and-pin type units in areas where heavy industrial deposits are experienced. An ounce of solid matter has been collected from an insulator after it has been on the line for six weeks. Also the lines are in a river valley in Kent and Sussex near cement works where mists are prevalent. The record of faults on these lines is given, together with an account of the procedure followed to reduce their number. It was found necessary to increase the original insulation, and the conclusion is reached that almost complete reliability of insulation has now been attained by using 4-unit suspension-insulator strings and by carrying out one cleaning operation per year.

A description and discussion are given of existing insulator designs which show improved performance under deposit conditions. New designs are described, particular attention being given to utilising "wind-washed" surfaces. The features of design necessary to secure the maximum extent of wind-washed surface are considered. The degree of limitation imposed on the obtaining of high deposit characteristics by the existing wet-flashover requirements is discussed. Improved behaviour under industrial deposit can be obtained by sacrificing wet-flashover characteristics, but this is not recommended. The section dealing with new designs is, in the main, an account of development work still proceeding, rather than a record of final accomplishment. One design has, however, reached the stage of being tried out on a large scale on the British grid at 132 kV. Pin-type insulators are briefly considered.

In Part 2 two typical examples are given of saline trouble on 33-kV pin-type insulators. The mechanism of failure is discussed and it appears to be necessary to provide different designs for two kinds of deposit. An account is given of development work resulting in an insulator which appears to have solved the trouble described in the first typical example. This insulator was unsatisfactory, however, when tried as a solution for the second example, and a suggestion is made to classify saline deposits, according to their severity, as "ordinary," "severe," and "extreme." Designs of pin-type insulators for extreme salt conditions are described. Cap-and-pin type insulators are briefly considered.

Some of the designs discussed are those of Electric Transmission, Ltd., and of Taylor, Tunnicliff & Co., Ltd.

An Electric Runabout

SIGNIFICANT of the increasing interest in battery-driven vehicles was the opening of new showrooms at 167, Shaftesbury Avenue, London, on Monday last by Messrs Partridge, Wilson & Co., Ltd., Davenset Works, Leicester. Apart from commercial vehicles, a new coupé designed on modern lines was demonstrated. In appearance the car is identical with a petrol-driven one, as will be seen from the accompanying illustration.

The new Partridge Wilson electric coupé

Starting and speed are controlled by one pedal. In addition to this pedal the only driving controls beyond the steering wheel are a switch on the dashboard which actuates the reverse, the foot-brake operating on all four wheels and the hand-brake. The car has a top speed of over 30 miles an hour, and will cover 30 miles on one charge of electricity. It is equipped with a 12-V electric lighting system, an electric horn and a double electric screen wiper. As the actual power unit is a small and simple series-wound ventilated electric motor the annual tax on the car is only £4 10s. The source of power is an Exide Ironclad battery.

Maintenance costs are practically nil and recharging is a simple matter. Equipment is supplied with the car for installation in a garage, and all that is required is to plug in. The car can be left, the supply being automatically cut off when the battery is fully charged. While the car is in use a "Sangamometer" on the instrument board shows the state of charge. In the unlikely event of the battery being completely "down" when the car is put away at night, it will be recharged fully within eight hours, ready for service next morning. The battery has also considerable powers of recuperation. Admittedly the cost (chassis £220, coupé complete £385) is high at present, but when the demand grows this will no doubt be considerably reduced.

The coupé is fitted with a luxurious "occasional-four" body finished in "Marina" blue cellulose and chromium plating, but other coachwork can be specified.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Rural Development

I was interested in your report of the backwardness of farmers in adopting electricity in the Northampton area. While I was living in that district last summer a local paper contained a statement that electricity was dangerous, based on the fact that a certain farmer had had some of his cattle killed by shock, due no doubt to a faulty installation.

I took the opportunity of writing to the paper to controvert the statements made and to advocate the employment of electrical equipment by the farmer and agriculturist. I also stressed the point that electrical equipment on the farm (or anywhere else) should not be abused but constantly maintained in a sound condition. There is no doubt that farm electrification must be carried out by competent electricians—not by badly-paid, inefficient labour.

Then, on the matter of salesmanship, it must be remembered that the farmer needs totally different treatment from that which is suitable to the urban consumer. F. ASPDEN.

Blackpool, *March 12th.*

"Physician, Heal Thyself!"

"Criticism is a study by which men grow important and formidable at a very small expense"—so opens Samuel Johnson's "Dick Minim the Critic." I feel constrained to suggest that Mr. J. Baggs and the host of other "Dick Minims" who appear to take a delight in criticising the E.D.A. and its methods, should first convince themselves that they are not guilty of endeavouring to remove the mote from their brother's eye, although suffering from the disability of a beam in their own.

I feel sure that one of the greatest obstacles to the satisfactorily rapid development of domestic electrification with which the E.D.A. and the E.A.W. appear to be primarily concerned, is the army of unconvinced and, in some cases, antagonistic individuals to be found amongst electrical engineers. If we are to be successful in persuading the layman to adopt electrical methods, surely it is essential that we should be able to demonstrate that we have the courage of our convictions, and have already made our own houses all-electric. I consider that every electrical engineer whose home is not all-electric is contributing to a more effective brake on development efforts than the most virulent gas propaganda could achieve.

If we could take a census of active E.D.A. and E.A.W. members, as well as their critics, I feel sure that the number owning all-electric houses, and disowning coal and gas, would be such a small proportion of the whole that engineers would feel ashamed at the lack of enthusiasm in their own ranks for the service which gives them their livelihood. In my own experience, I have met more arrogant and contemptuous repudiation of the all-electric house from electrical engineers and their wives than from the layman, who, I am convinced, would be encouraged to electrify his home more and more if only we set him the example. A.M.I.E.E.

March 16th.

Sir Ralph the Rover

I notice that Sir Ralph Wedgwood, in a recent newspaper article, under the optimistic title of "The Railways Up and Doing," describes rush hour traffic as the railway officials' nightmare and states that "even electrification does not remove the pressure, or solve the problem." This attitude seems inconsistent with the fact that Sir Ralph Wedgwood was one of the signatories of the Weir Report which, while concerned mainly with the benefit of electrification for inter-urban and other main line services, was virtually based on the established

Views of the new showrooms of Chesterfield Corporation Electricity Department, showing the exterior, and the bathroom, bedroom and kitchen of the all-electric flat

principle that electric traction materially increases the traffic capacity of congested steam lines.

It may be, of course, that Sir Ralph has not changed his mind. He goes on to declare that the only remedy for overcrowding lies in "almost unlimited capital expenditure" and to state that "we would avail ourselves only too gladly of any facilities which a benevolent Government might afford towards the raising of the necessary capital." From this it seems clear that the reason why the dwellers in the eastern suburbs of London are still condemned to be strap-hanging sardines is not that the railway directors are against electrification but that they want the aid of national credit in financing the conversion. ELECTRON.

March 15th.

The Cost of Appliances

Many people must be anxious to have the assistance that electricity is able to render in the home, but find the first cost prohibitive. I live in the Manchester district, in a new house assessed at £28 and use electricity for lighting and electric iron only.

I am much attracted by a vacuum cleaner—a £20 model—but I can get quite a lot of domestic help for £20. The price is far too high; mass production methods of manufacture should have lowered it by 50 per cent., but apparently reduced production costs are not passed on to the buyer.

I am afraid the electrical trade is, amongst other things, suffering from an overdose of salesmanship. There is not a shadow of doubt about there being a market for the goods; any intelligent person would gladly possess many of the appliances that are so useful in the home if the price was right. The little army of pests going from door to door trying to stampede folk to "sign on the dotted line" are really unnecessary. Let the goods speak for themselves and give them a chance by lowering the price. A. J. H.

March 13th.

A London Change-over

On page 273 of your issue of February 22nd you print two photographs of a London change-over job which to me appears very unsound, I might even say unsafe, because in both the old and new lay-outs non-airtight fuse cases are mounted within a few inches of the top of the gas meter and in the new lay-out meter terminal blocks are mounted in a similar position.

We all know that fuses sometimes melt and many of us have experienced hot meter terminals due to internal looseness occasioned by vibration. It seems therefore a dangerous practice to mount this apparatus near the top of a gas meter and particularly, as in the example photographed, in the angle between the wall and the ceiling above a high mounted gas meter.

In these remarks I have not included the switches as it is not clear from the photographs whether these have sealing glands, in which case they would be safe.

Selby, *March 12th.* H. G. BATSON.

A Skilled Man's Plaint

I have read with considerable interest the correspondence from Mr. Harry Rose and Mr. Alex. Milne, in which both these gentlemen complain very bitterly of competition from the numerous "carpet bag" type of wiremen who style themselves "electricians" and "get away with it," and was somewhat amazed to find that you headed this correspondence "Skilled Man's Plaint." I think this puts it mildly. It is a great injustice not only to all skilled men, but to every bonafide electrical contractor, and the people responsible for this condition of affairs are the E.C.A. (although we admit being members), the architects, the speculative builders, the supply companies and borough electrical engineers, and even editors of electrical trade journals.

Greater publicity should be given to these unfair conditions A concerted effort should be made at once to stop the appalling so-called "work," some of it positively dangerous, especi ally on a.c. supply, that at present passes for "electrical installation." Many builders in this district pay as little as 6s. per point for the electrical installation! Quite recently we displayed a large poster at a local building exhibition, the moral of which was "if the building societies and the insurance companies only knew the quality (?) of the electrical installation in some of the houses which they finance and cover for fire risk, some concerted action would be made."

There is no excuse for the E.C.A., for it claims to represent our interests, and sometimes, frankly, we wonder why we support such an association. Maybe it thinks we are amply repaid by a small rebate on cable. It is positively amazing that quite a number of builders (thank Heaven there are a few brilliant exceptions, but very few) will sell houses for £800-£1,200 and will not allow a p.c. sum of a quarter of 1 per cent. for the electrical installation! They appear to be content to employ itinerant "carpet bag" electricians operating from private houses in many instances, and as long as they get a connection to the company's mains, they do not seem to care a rap whether the installation is good, bad or indifferent, or what trouble the householder will have at some future date. They appear to be entirely ignorant of the great danger, especially from a.c. supply, to which both adults and children are exposed by shoddy, uneconomical wiring.

Some of the borough electrical engineers of the writer's acquaintance claim that they have no authority to "turn down" an electrical installation provided it shows a reasonable insulation test. If they have no power to rigorously condemn such wiring as we have described, out of which no decent electrical contractor can make a profit, is it not high time that they were big enough men to seek the power or forthwith exercise it and stand by the consequences?

Drains must be in accordance with certain regulations of the borough surveyor and so must the plumbing fixtures. Walls and floors have to be in accordance with certain prescribed requirements, yet in a highly intricate electrical installation with fully "earthed" appliances all around such as sinks, wash basins, built-in electric fires, three-pin plugs, &c., any old thing will do. Are we to wait until your journal has reported many more deaths from electric shock before some serious action is taken? AUTOCAR ELECTRICAL EQUIPMENT CO., LTD.,

Ilford, *March 15th.* E. G. Ford, *Managing Director.*

As an old timer I thoroughly agree that the electrical wiring industry is in a bad way, but this seems to me to be largely the fault of those who should control it. I recently saw in Oxfordshire work that had been carried out by a registered contractor which included amongst other "novelties" switch blocks *nailed* to walls and ceiling roses fixed without blocks. This contractor had not a qualified (indentured) electrician on his staff and the above work was carried out by an ex-busman. What do such people care if they can "get away with it."

Also in a western county town, where the change-over is being carried out by direct labour, amongst those who are supposed to be doing skilled electrical work are an ex-insurance agent and an ex-house-to-house canvasser. Yet the head of this department and also of the supply authority are associate members of the Institution. Surely this is where some of the blame should be laid.

It should not be difficult to arrange that registered contractors and supply authorities should employ only those who have had at least some training in electrical work.

March 16th. WESTERN.

I have endeavoured to elucidate the question of labour shortage principally from my own point of view—that of the man who has just returned from engineering for twelve years abroad and who now wants to engineer in England but for some obscure reason is persistently being "turned down" on account of that service abroad.

One very frequently sees the assertion that skilled engineers are scarce, due, I am told, to former engineers having forsaken their trade during the acute depression. Be that as it may, I am also informed that the engineering trade has made a wonderful recovery, particularly the electrical side of it, and yet there is still a surfeit of genuinely skilled engineers; the reason appears to be that employers are employing unskilled men for cheapness, and, let it be observed, to the detriment of the work concerned. I have recently seen installations and electrical manufactures with which I would have been thoroughly ashamed to have associated myself, even as an apprentice. G. ROPER-THOMPSON.

Glasgow, *March 18th.*

The Purchase of Coal

In the course of his letter in your issue of March 15th, Mr. A. B. Owles states that "the free moisture retained by the tin is often neglected in the moisture determination serves to indicate inexperience or carelessness." This is, I think, amply proved by the three tests referred to on page 342, which show a considerably larger discrepancy than the 2.9 per cent. given by him.

In the article it is made quite clear that two of these samples were checked by outside authorities, and it will be observed that there is a difference of 37.6 per cent. in the free moisture content based on the lowest result, and a difference in the total moisture of 20.5 per cent. based on the lowest value, which without doubt confirms Mr. Owles' suggestion of carelessness, but not on the part of the undertaking or plant testing engineers. These tests were quoted to show how fuel test results can vary with one sample of coal, and not with the intention of conveying the idea that the boiler test was passed as "O.K."

Mr. Owles is fortunate if in his twenty years' experience he has never seen duplicate tests—carried out by different authorities—vary more than 1 per cent. From my own personal experience, as well as from that of other engineers, I must disagree that discrepancies are likely to creep in only with sampling.

Any one chemist will guarantee his testing, but the results from all chemists will not always agree. "Square Peg" is evidently in agreement with this as in the fourth paragraph of his letter he states "the forwarding of samples to the colliery or independent laboratories for checking is quite futile."

To say "that free moisture does not matter greatly except in so far as it affects the calorific value" is rather extraordinary. If fuel is purchased upon the "as received" basis then the free moisture content is of the utmost importance, as the greater this percentage is the less will be the "as received" calorific value, and consequently the less the price paid per ton. A colliery company can guarantee "size" with washed coal if its equipment is laid out accordingly. The fuel referred to (page 342) is extracted from the washing plant, being separated into the various sizes over screens, and carried to the loading plant on conveyors which merge at this point so that any mixture can be obtained by altering the conveyor speeds.

"Square Peg" has missed the point when he states "it seems reasonable to state the class or size and leave the percentage of various meshes to be dealt with if the occasion arises."

The occasion had arisen when the sampling referred to took place. It is a recognised fact that with a large proportion of coals the greater the percentage of duff the greater is the ash content. Then why should I allow a colliery to supply a fuel containing 35.6 per cent. of duff (or low-grade fuel) when it has guaranteed a duff proportion of 20 per cent. with a maximum of 25?

Regarding my statement that "coking coal cannot be burnt out properly owing to its burning in patches," I agree that proper wetting is invariably essential with this class of coal, but the sample quoted in my article will not yield to any treatment. Although it is necessary, as stated by "Square Peg," to burn this off well under the arch it must be emphasised that the burning of such a coal adds to maintenance costs owing to the intense heat adjacent to the shutter, or guillotine, reducing the life of the latter, not forgetting the higher temperature at which the grates run.

R. Wright,
Carlisle, *March 18th.* *Works Superintendent.*

Safety in Theatres

In your last issue there appeared letters from both the chief engineer of the Gaumont-British Picture Corporation, Ltd., and the supervising electrical engineer of Associated British Cinemas, Ltd., advocating that safety lighting should be normally fed from the same source as the general lighting and, in the event of an emergency affecting this common source, be supplied from a trickle-charged battery through the intervention of a contactor device.

As your correspondents are, no doubt, aware, such a system does not comply with the present requirement (Clause 13b of the 1923 Regulations under the Cinematograph Act, 1909). This calls for the safety lighting to be continuously supplied from a source distinct from that for the general lighting. The wisdom of this cannot be questioned. Under such an arrangement an "emergency" condition that concerns the general lighting source does not extend to the safety lighting.

The arrangement which they advocate makes it possible to have electrical safety lighting and to utilise, in a stand-by form, a battery of relatively small capacity. The economic factor is introduced. But the arrangement contravenes the regulation. It is difficult to believe that it will be permitted in the future, for so recently as last year a special Home Office announcement condemned the use of such a system.

An alternative arrangement is to employ a small-capacity battery "solid" to the safety lighting main terminals or bars, the latter being also connected to a d.c. source that may be derived from the general lighting source, but that can only give, and not receive, energy; the battery may be floating or be obtaining a small charge. This scheme appears to have received official sanction. It obviously is simple and more reliable than one dependent upon a contactor switch. After all, though contactor switches are used universally they are by no means all operated in the very positive manner that is imperative for safety lighting. G. E. Moore.
Sunderland, *March 18th.*

Having had considerable experience of electrical installations in theatres and other places of entertainment, I agree with your correspondents, Messrs. S. Hart and W. McInally, on the merits of the safety lighting system to which they refer, but its use in theatres and cinemas is retarded in most areas by local licensing authorities. This is due to the fact that, normally with this system, the safety lighting is mains operated, while the battery is "standing by." Therefore in the event of an interruption to this supply the safety lighting will be dependent upon the action of an automatic change-over switch for the purpose of transferring the load to the battery.

In the case of one particular cinema wherein this system is installed the authorities have demanded that it shall be replaced by one wherein the battery is *permanently* connected to the safety lighting. The most convenient way of achieving this condition is by the use of a motor-generator, with the battery floating in parallel across the generator. This condition also ensures that the battery is never electrically connected to the main supply.

One disadvantage of this system, however, is that adjustment of the shunt regulator becomes necessary when more lights are turned on as darkness approaches, otherwise serious discharge of the battery would occur. But this, and other disadvantages, have been practically eliminated in some of the latest floating battery systems.

Liverpool, *March 18th.*

Quick Boiling

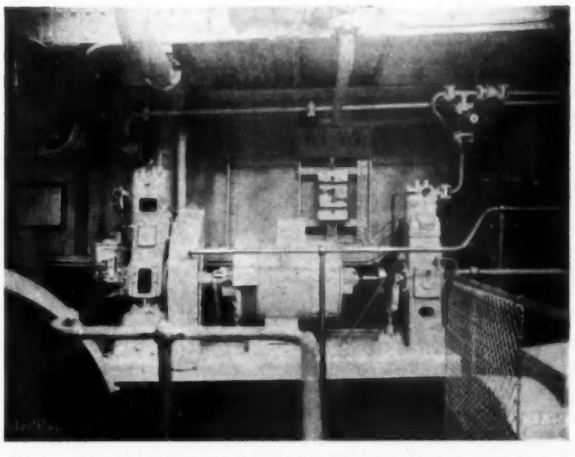
The remarkable developments now taking place in the electrical industry are simply staggering at times. Our Electrical Development Association is a real "live wire," but I do think that it should give us advance news in those cases where it is responsible for radical changes in apparatus design from a load-building point of view. Progressive company and municipal undertakings who are endeavouring to look ahead by putting down maximum size l.v. copper are now faced with the problem of putting in separate sub-stations for each house if E.D.A. succeeds in creating a boom demand for the wash-boilers which are described on page 14 of the Association's March *Bulletin*.

Presumably it is a 10-gallon size as usual and if so, according to my calculations, the "rapid operation" type which is mentioned would produce boiling water (from 48 deg. start) in 19 seconds. One hundred per cent. efficiency is assumed as there would be no time for radiation losses to commence. Now, what about the economical housewife who commences operations with a boiler full of really hot water (say 180 deg.) from one of our very efficient thermostatically controlled, and properly lagged electric water heaters? Boiling in 3.7 seconds is quick service indeed, and appears to leave "Mr. Therm" nowhere.

As previous mention is made of the fact that the apparatus can be used from the lighting circuit, I am very relieved to find that my recent anxiety over 2-A plugs and "15 kW restrictions" was a figment of my own imagination. G. M. D.
March 13th.

Smoke Prevention

It appears from the facts given in the leading article of your issue of March 15th that the four giant chimneys at Lots Road are being blamed for the misdeeds of their less prominent brethren in the neighbourhood. We sufferers want to be fair, and with the facts before me I think it only right to withdraw any unjust criticisms contained in my recent letter to you on the subject. G. L. Thursfield.
London, S.W.3, *March 18th.*



The auxiliary generating set of the Diesel-electric tug "Framfield." (See page 413)

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Builder's Wash-boiler

The "Burco" builder's boiler

With a view to encouraging builders to fit electric wash-boilers as standard equipment in new houses, BURNLEY COMPONENTS, LTD., Rose Grove, Burnley, have introduced a new boiler of 8-gal. capacity. The element, which has a maximum loading of 2.5 kW, is controlled by two foot-operated switches giving three-heat control. The casing is constructed of galvanised steel and the pan of copper, tinned on the inside, with all seams double lapped before tinning. A tight-fitting hinged lid and three strong feet are included as standard and the cable is taken through a watertight gland to the element connections.

A Telescopic Table Standard

The unusual construction of the "Slyderowl" table standard, a new product of MESSRS. DRAKE & GORHAM WHOLESALE, LTD., 77, Long Acre, London, W.C.2, enables it to be extended telescopically in height from 10 to 16 inches. Three-core flexible is fitted, and twelve coloured finishes in addition to chromium plate are obtainable. The illustration shows the stem partly extended.

The D. & G. telescopic table standard

Relieving Cutters

MESSRS. EDGAR ALLEN & CO., LTD., Imperial Steel Works, Sheffield, advise us that they are placing on the market form-cutters and hobs of "Stag" high-speed steel in which, while the form remains constant, the propensity of form-relieved cutters to rub or not to cut freely under heavy feeds is overcome. They will be provided with Challice corrected straight-line relief, and will be marketed under the name of "Sharpaform."

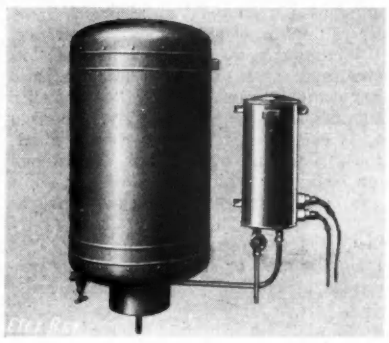
Outdoor Terminal Boxes

The new range of outdoor inverted terminal boxes, introduced by BRITISH INSULATED CABLES, LTD., Prescot, Lancs, covers pressures from 3.3 kV to 11 kV for conductors from 0.12 to 0.30 sq. in. Tests on the completed boxes in accordance with the British Standard Specification for the Electrical Performance of High-voltage Bushing Insulators, show a high factor of safety over the minimum standard requirements, which should make these boxes suitable for installation in districts where smoke fumes or salt-laden spray occur. The boxes are suitable for wall, cross-arm or pole mounting. For the last mentioned a chain-type pole strap is available which will suit all sizes of British Standard poles. The horizontal joint between the lid and the box is arranged above the level of the internal fittings so that, before filling, the disposition of the fittings and the clearances between conductors and box are clearly visible. Filling holes are provided in a recess in the centre of the lid for further topping up. This recess can be filled with compound after the plugs are inserted. The shedded insulators, of brown glazed porcelain, are in two parts, the outer portion being replaceable.

A B.I. outdoor inverted terminal box

Booster for Water-heaters

The "Swan" electric booster, which is designed particularly for use in restaurants and similar places, works in conjunction with a thermal storage tank as shown in the illustration, the purpose of the booster being to raise the temperature from 180 deg., at which it comes from the hot-water system, to boiling point. It is mounted on the wall at a height which allows it to fill automatically from the thermal-storage tank; when switched on, boiling water can be drawn off almost at once. There is a non-return valve in the inlet pipe.



The "Swan" booster fitted to a thermal-storage tank

The two elements are each loaded at 1,500 W and incorporate automatic safety devices, although the outlet pipe which is controlled by a tap is so arranged as to ensure that there is always sufficient water in the booster to cover the elements. The manufacturers are MESSRS. BULPITT & SON, LTD., Camden Street, Birmingham.

The Hoover "Junior" Cleaner

A "Junior" vacuum-cleaner has been introduced recently by MESSRS. HOOVER, LTD., Perivale, Greenford, Middlesex. It incorporates a beater-sweeper in the same way as the larger models, and in other respects the design is also similar. The machine, of course, is smaller and does not embody the "headlight." An extra charge is made for a set of dusting tools which are very simply attached.

The Hoover "Junior"

An Individual-drive Unit

A motor which incorporates speed-reduction gear, the secondary shaft of which carries a stepped pulley for belt-driving any machine, has been placed on the market by the SADI ENGINEERING CO., LTD., 29-31, Portugal Street, Kingsway, W.C.2. The speed-reduction gear box terminates in a rod fitting into a cast-iron cylinder containing a spiral spring. For tightening the belt the spring lifts the motor; for slackening, the motor is displaced by a hand or pedal lever. An automatic catch retains the unit in the lower position to facilitate the shifting of the belt.

Unusual Table Lamps

New table standards: The fluted type is a product of the Crystal Glass Co., Knottingly, the other two being made by Messrs. Waite & Son, Ltd., Bond Road, Mitcham

British Overseas Electrical Trade

Substantial exports of machinery

THE accompanying figures, extracted from the Board of Trade returns, show that during February our electrical exports amounted in value to £1,020,145, compared with £820,711 in the corresponding month of last year and £676,953 in February, 1933. Actually, the improvement of 24 per cent. over last year was not so good as in January, when 30 per cent. was attained.

A satisfactory feature of the month's trade was the increase in machinery exports, except for the larger types of generators. In the case of motors and control gear an advance of no less than 90 per cent. is recorded. Considerable quantities of equipment shipped to some of our lesser markets, which are not enumerated separately in the returns, have helped to keep the figures over the million mark in a short month. Altogether, there was an increase of 40 per cent. in the requirements of these countries, and so far as unspecified electrical machinery is concerned the figures were nearly trebled. On the contra side, the demand for radio receivers and transmitters fell, and there was a decided slump in the overseas accumulator market.

As in January, exports of cable and telegraph and telephone apparatus were good. The chief destinations, with comparative values (1934 figures shown in parentheses), were as follows:—

Rubber insulated wires and cables.—Australia, £20,502 (£12,844); South Africa, £18,378 (£15,457); British India, £12,446 (£18,514); New Zealand, £4,194 (£2,096); other British countries, £10,093 (£11,079); foreign countries, £10,377 (£5,830).

Electric wires and cables (insulation other than rubber).—South Africa, £31,523 (£19,981); British India, £18,881 (£13,854); Australia, £7,341 (£6,928); other British countries, £13,573 (£14,208); foreign countries, £13,997 (£10,845).

Telegraph and telephone apparatus (other than radio).—South Africa, £22,155 (£6,825); Australia, £9,421 (£12,993); Canada, £465 (£955); other British countries, £16,356 (£16,734); Argentina, £5,529 (£12,788); other foreign countries, £52,516 (£26,586).

Chiefly on account of an increase of £23,171 in unenumerated goods and apparatus, imports were 20 per cent. more than in February, 1934, which is 4 per cent. higher than the January increase. There was, however, a falling tendency in several of the specified sections, notably in machinery.

The values of imports from various sources, with comparative figures, were as follows:—

EXPORTS AND IMPORTS DURING FEBRUARY

	Exports. February, 1935.	Exports. Inc. or dec. compared with February, 1934.	Imports. February, 1935.	Imports. Inc. or dec. compared with February, 1934.
Submarine telegraph and telephone cables	£8,593	− £7,685	*	—
Telegraph and telephone wires and cables (not submarine)	39,084	+ 25,548	*	—
Other insulated wires and cables	161,305	+ 29,669	£19,986	+ £4,106
Radio receivers (not radiograms) excluding valves	19,458	9,196	14,767	+ 9,194
Radio transmitters (excluding valves)	20,200	− 11,158	*	—
Radio valves	38,477	+ 16,657	15,108	+ 737
Other radio parts and accessories	37,274	+ 8,558	38,504	+ 9,113
Telegraph and telephone apparatus (other than radio)	166,442	+ 29,561	*	—
Electric carbons	*	—	12,690	− 891
Incandescent lamps	40,894	+ 8,506	6,933	− 1,428
Other lighting apparatus	33,653	+ 6,016	21,751	+ 4,199
Primary batteries	13,383	+ 768	315	− 132
Accumulators	37,053	− 22,502	*	—
House service meters	14,077	+ 1,579	*	—
Other electrical instruments	17,782	+ 6,710	18,211	− 1,796
Unenumerated electrical goods and apparatus	107,097	+ 22,108	59,079	+ 23,171
Electric generators up to 200 kW	25,010	+ 7,839	*	—
Electric generators over 200 kW	34,135	− 6,958	*	—
Electric motors	81,247	+ 31,208	17,065†	− 5,167
Convertors and transformers	43,763	+ 7,907	*	—
Starting and controlling gear for motors	48,415	+ 30,056	*	—
Switchgear	81,536	+ 20,770	*	—
Other electrical machinery	11,267	+ 3,473	6,038	− 151
Electric vacuum cleaners	*	—	13,876	+ 1504
Total	£1,020,145	+£199,434	£244,323	+£42,459

* Not classified separately. † Not railway and tramway motors.

Electrical goods and apparatus.—Germany, £59,929 (£51,373); United States, £43,342 (£27,741); Netherlands, £39,696 (£29,425); Belgium, £11,597 (£4,096); Switzerland, £10,431 (£12,097); Austria, £8,163 (£8,785); France, £7,417 (£5,742); other foreign countries, £12,109 (£12,697); British countries, £14,660 (£9,115).

Vacuum cleaners were supplied by the following:—United States, £4,526 (£1,230); Sweden, £4,356 (£7,170); Germany, £552 (£564); other foreign countries, £888 (£1,622); Canada, £3,604 (£1,786).

BRITISH ELECTRICAL EXPORTS DURING FEBRUARY

Destination.	Goods and apparatus Feb., 1935.	Inc. or dec. compared with Feb., 1934.	Electric generators, Feb., 1935.	Inc. or dec. compared with Feb., 1934.	Motors, Feb., 1935.	Inc. or dec. compared with Feb., 1934.	Other electrical machinery, Feb., 1935.	Inc. or dec. compared with Feb., 1934.
Irish Free State	£28,734	+ £7,361	*	—	*	—	*	—
Union of South Africa	118,076	+ 30,574	£34,161	− £471	£13,873	+ £2,405	£60,704	+ £7,935
British India	92,498	+ 3,101	7,610	+ 3,251	11,320	+ 3,173	27,968	− 3,992
British Malaya	13,223	+ 4,406	*	—	*	—	1,743	+ 648
Ceylon	3,730	+ 32	*	—	*	—	*	—
Hong Kong	8,053	− 9,348	*	—	*	—	*	—
Australia	68,566	+ 14,401	1,141	− 720	9,768	+ 7,379	7,823	+ 6,025
New Zealand	33,220	+ 7,027	*	—	1,877	+ 63	8,828	+ 5,355
Canada	6,310	+ 1,349	273	− 208	3,481	+ 1,559	1,910	+ 1,197
Other British Countries	49,175	+ 8,665	5,581	− 2,723	12,426	+ 6,206	29,216	+ 16,875
Sweden	21.051	+ 16,342	*	—	*	—	*	—
Denmark	13,833	− 8,704	*	—	*	—	*	—
Belgium	9,526	− 220	*	—	*	—	*	—
France	13,338	+ 5,239	*	—	*	—	4,043	+ 3,482
Spain	8,537	+ 1,790	*	—	*	—	*	—
Italy	17,456	− 1,076	*	—	*	—	*	—
Greece	3,304	− 8,559	*	—	*	—	*	—
Egypt	9,572	− 2,347	*	—	*	—	1,421	41
China	14,093	+ 6,691	*	—	*	—	2,773	− 358
United States	9,327	+ 8,163	*	—	*	—	*	—
Argentina	22,262	− 4,333	*	—	2,979	+ 2,834	1,138	+ 464
Soviet Union	*	—	*	—	*	—	298	+ 72
Netherlands	*	—	—	− 126	*	—	878	− 300
Other Foreign Countries	130,888	+ 24,585	10,379	+ 1,878	25,523	+ 7,589	36,238	+ 24,844
Total	£694,772	+ £105,139	£59,145	+ £881	£81,247	+ £31,208	£184,981	+ £62,206

* Not classified separately.

In the Courts

THE Court of Appeal, consisting of the Master of the Rolls and Lords Justices Romer and Maugham, delivered judgment on March 15th in the appeal by the Mullard Radio Valve Co., Ltd., from the judgment of Mr. Justice Farwell in the Chancery Division dismissing the action brought against the Philco Radio & Television Corporation of Great Britain, Ltd., George Robinson & Son, Ltd., and London Piano & Radio, Ltd., for an injunction (and the usual ancillary relief in a patent action) to restrain the alleged infringement of the appellant company's letters patent No. 287958 dated December 24th, 1926, relating to an invention for "improvements in or relating to circuit arrangements and discharge tubes for amplifying electric oscillations."

The Master of the Rolls, in giving judgment, said the main point on the appeal was whether plaintiffs' claims 2 and 5 were invalid for want of subject matter. Mr. Justice Farwell had held that the plaintiffs' first claim was valid, but he dismissed the action on the ground that claims 2 and 5 were invalid for want of subject matter, and the real issue in the case was whether claim 2 was valid as the decision on claim 2 must decide that on claim 5.

The Master of the Rolls agreed with Mr. Justice Farwell that claims 2 and 5 could not be maintained, and he was of opinion that the appeal failed and should be dismissed with costs.

At the conclusion of his Lordship's judgment he said he desired to express the thanks of the Court for the valuable assistance of Mr. E. B. Moullin, who had sat with the judges during the arguments on the appeal as assessor. Lords Justices

Romer and Maugham delivered concurring judgments. The plaintiffs were given leave to appeal to the House of Lords.

Overhead Lines Trespass Case

At Winchester County Court on March 13th before His Honour Judge Barnard Lailey, Cathleen Hunter, of Bishop's Sutton, Alresford, claimed £10 damages from the Mid-Southern Utility Co. for trespass.

The plaintiff stated that overhead lines had been erected across her property without her permission. In reply to a letter of complaint the defendants had apologised for the fact that their contractors had infringed her rights. She had subsequently refused to sign a form agreeing to the lines crossing her land.

The defendants denied that there had been any trespass. They had twice called upon the plaintiff to obtain her permission but each time she had been out. It was claimed that the damages should be nominal.

His Honour gave judgment in favour of the plaintiff for the amount claimed with costs.

Alleged Injury to Electric Line

At Dumfries Sheriff Court on March 15th Geoffrey Victor Vaughan, assistant electrical engineer, and Alexander Dobie, a foreman, both employés of the Kirkcudbright County Council, were charged on indictment with having on January 31st, 1934, while acting together at the electricity generating station at Barrhill, Dalbeattie, unlawfully and maliciously cut or injured an electric line, the property of the County Council, with intent to cut off supply of electricity from the central district of Dalbeattie, contrary to the Electric Lighting Act, 1882, whereby supply of electricity was cut off from four street lamps in the district, and from about 400 dwelling houses and business premises.

Objections to the relevancy of the charge were made by agents, but these were repelled by the Sheriff after argument. Pleas of "Not guilty" were tendered by both men. Sheriff Johnston said the trial would take place on March 27th at Dumfries.

Winding-up Petitions Adjourned

A petition for the winding-up of Rotor Electric, Ltd., of Robert Street, N.W., presented by Messrs. Wilkins & Wright, Ltd., Newman Street, London, W., was in the list for hearing before Mr. Justice Bennett in the Companies' Court on Monday. When the petition was called on Counsel said that it was a creditor's petition on a judgment against Rotor Electric, Ltd., for £130, but as there was a probability of a settlement being arrived at he asked that the petition should stand over until April 15th. Mr. Justice Bennett granted the adjournment asked for.

On the same day Mr. Justice Bennett had before him a petition by the Electrical Press, Ltd., for the winding-up of Cliffdown Appliances, Ltd. Counsel for the petitioners said that his clients were judgment creditors against the Cliffdown Appliances Co. for £60, and their petition was supported by another creditor for £35. He said that the debtor company was making some offer and in these circumstances he would like the petition to stand over for one week. His Lordship assented and accordingly the petition stands over until March 25th.

Parliamentary News (BY OUR SPECIAL REPORTER)

ON March 12th the Reading Corporation Bill came before a Select Committee of the House of Commons. Mr. D. D. Reid (Down, U.) presided. Clauses in the Bill propose to confer further powers on the Corporation in respect of its electricity undertaking.

Mr. Parker, Parliamentary agent to the Corporation, said it was proposed to form an advisory committee to consider the electricity clauses. The Speaker's Counsel (Sir Fredk. Liddell) and Counsel to the Lord Chairman of Committees in the other House (Lord Kilbracken) would be members of the committee. No petitions had been lodged against these clauses, and so it was proposed that they should be passed on the understanding that the promoters would adopt in another place any recommendations made by the advisory committee.

The committee agree to this course.

Sunderland Tramways Extension

On March 12th the Standing Orders Committee of the House of Commons, presided over by Sir Dennis Herbert (Watford, U.), Chairman of Ways and Means, met to consider the petition of the Sunderland Corporation for leave to promote a Bill in respect of which there had not been compliance with the Standing Orders. Included in the Bill are clauses empowering the Corporation to construct electric tramways. The Committee decided to dispense with the Standing Orders and to allow the Bill to proceed on condition that the clause empowering the construction of an electric tramway outside the borough was deleted.

Folkestone Electricity Bill

On March 13th the Folkestone and District Electricity Bill was considered by the House of Lords Committee on Unopposed Bills. Lord Stanmore presided.

By this Bill provision is made for the purchase by Folkestone Corporation of the undertaking of the Folkestone Electricity Supply Co. on giving six months' notice to expire on July 1st, 1938, or similar notice in each subsequent tenth year. The consideration for purchase is to be the payment of the certified capital expenditure up to July, 1932, plus 5 per cent., and capital expenditure between that date and the time of purchase, with certain deductions in respect of depreciation. If the Folkestone undertaking is purchased the Corporation must also take over the Elham undertaking of the company at the same time and on the same terms.

After formal evidence the Committee approved the Bill and ordered it to be reported for third reading.

Electricity Supply Organisation

The case for non-interference

IN our issue of November 30th last (page 768) we reviewed a monograph on "The Socialisation of the Electrical Supply Industry," by "G. H." Now there has been published a reply to this from the non-Socialist point of view—"Electricity and Nationalisation: An Alternative," by "Civis" (49 pp., Ernest Benn, Ltd., 1s. net).

Except as regards their anonymity, the two writers have little in common. "Civis" commences his book with a brief summary of the earlier work, and then proceeds to attack the premises on which "G. H." based his case. In "Civis's" view Great Britain is not electrically backward, or (as they say in the Courts), if it is, the existence of a strongly entrenched gas industry is the explanation.

The "absurdity" of having six or seven hundred distributing authorities is attributed to Government interference in the past, but the combination of these into larger areas, it is held, will not ensure economy. The concentration of generation is approved, but distribution over wide areas means long and expensive mains. It is shown that some of the most successful large undertakings have distribution costs per kWh above the average for the country, and there is little prospect of economy in this direction.

The author of the Socialist book cited the I.E.E. paper by Mr. J. M. Kennedy and Miss Noakes in support of his argument on distribution costs; "Civis" quotes a number of adverse opinions on the paper. He disagrees, too, with "G. H.'s" implication that there are six or seven hundred different tariffs (one for each undertaking), and shows that charges are more uniform than is generally supposed. The same opinion is expressed with regard to the number of systems of supply in use; "Civis" considers that the adverse effects of this lack of uniformity are exaggerated.

He deprecates the proposal that both wholesale and retail distribution should be in the hands of the Central Electricity Board as the two sides of the business are held to be quite distinct. On the question of salesmanship the author thinks that under national control the electricity supply department, instead of being like an enterprising shop, would probably resemble the average income-tax office.

It is contended that electricity can only be supplied to rural dwellers at urban prices at the expense of urban consumers. It is admitted that this might be in the national interest, but it should be done "with our eyes open."

Having presented the case against the Socialist proposals, "Civis" puts forward his own. He suggests that, instead of transferring the ownership of all undertakings, a central authority should exercise supervision. It would fix a standard of efficiency, and undertakings failing to reach this standard would be taken over temporarily or permanently to be transferred to another distributor or to the Central Board. This central authority, it is suggested, should be the Electricity Commissioners, with the necessary increase of powers to enable them to compel the amalgamation of areas when efficiency required it or prevent amalgamation unless in the interests of efficiency.

The author sets out what he considers to be the advantages of his plan. These include the retention of local knowledge and enthusiasm, the sorting out of the good undertakings from the bad, and the avoidance of an upheaval in the industry, and the stereotyping of distribution areas, administration and management.

In the last chapter—"The Results of Socialism"—the author endeavours to show that it would be likely to stultify enterprise, and says that we should be slow to discard the advantage of individual initiative "in favour of national ownership with its doubtful blessings and certain drawbacks."

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Electricity Supply Workers' Wages

An application by the trade union side of the National Joint Industrial Council for the Electricity Supply Industry for an increase in wages of 2d. per hour for all grades of employés engaged in the industry came before the joint negotiating committee of the Council in London on March 14th, under the chairmanship of Mr. J. Rowan. Mr. G. P. Dean, secretary of the trade union side, submitted an analysis of the profits of a number of electricity undertakings, and said that an improvement in wages was amply justified in view of the expansion that had taken place, and was still going on, in the demand for electric power. The meeting was adjourned until April 25th so that the employers might consider their reply.

Ironmongers' Electrical Activity

We recently reported the formation of an Electrical Section by the Ironmongers' Federated Association and the appointment of Mr. E. B. Holloway as honorary secretary. Mr. Holloway tells us that already the Section has over 300 members, and a strong and representative committee is being formed.

Municipal Trading at Liverpool

Liverpool, Birkenhead and District Ironmongers' Association on March 14th protested against the Liverpool Corporation electricity showrooms extending its activities by offering lamps for sale to consumers. Correspondence has passed between the Association, the Ironmongers' Association and the Town Clerk, and the last-named has informed the Association that the Electric Power and Lighting Committee was well within its rights and was wholly in favour of the Corporation exercising its trading powers in this way. The Ironmongers' Association decided to seek the interest and support of the Merseyside Chamber of Trade.

Heavy Duty Electric Cooking

The sixth sales conference of the Mid-East England Area of E.D.A. was held in Leeds on March 13th when Mr. S. C. Hurry, of the Jackson Electric Stove Co., gave a lecture on "Heavy Duty Electric Cooking, and its Value to the Supply Undertaking." He stressed the point that the heavy duty cooking equipment load was a most useful one to supply undertakings, and he showed some slides of existing installations and also some characteristic load charts. A discussion followed in which Messrs. R. M. Longman (C.E.B.), Easton (Manchester Electricity Department), and A. E. Elson (Halifax Electricity Department), took part. Mr. C. E. Allsopp (Bradford Electricity Department), the chairman, agreed that much more could and should be done to foster the heavy duty cooking load, and he produced slides and charts of the latter which showed that this load was definitely off peak and well worth cultivating.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages on the third pay day in April.

Higgs Motors Works Extensions

In the accompanying illustration we show the extensions in progress to the machine shop of Higgs Motors, Ltd., Birmingham. The company informs us that these extensions have become necessary owing to the increase in the demand for its motors and dynamos. The area of the extensions is 25,000 sq. ft., and the company is contemplating putting further extensions in hand before the end of the current year.

Work in progress on the new machine shop of Higgs Motors, Ltd.

Chilean Duties on Telephone Apparatus

The Commercial Secretary to H.M. Embassy at Santiago has forwarded to the *Board of Trade Journal* particulars of Customs duties imposed upon telephone apparatus imported into Chile as from January 23rd. These include apparatus for telephone and telegraph plants, with or without wires, complete distribution and control switchboards for electric plants or "centrals," on which the duty is 0.35 peso per kg. gross. The duty on telephonic receivers and transmitters and radiotelephonic receivers, including cases, loud speakers for receivers and spare parts, n.e.s., is 5 pesos per kg. legal and an additional tax of 10 per cent. of the duty. All the above goods are liable to a surcharge of 300 per cent. of the duty.

A Real Sky Sign

Flying at 1,500 ft. over the City, north and west of London and the West End, the first practical demonstration in this country of a neon lighting display by aeroplane attracted considerable attention last week. The 'plane, which was an Imperial Airways three-engined "Argosy," carried on the underside of the wings the words "Air Mail" in 6 ft. 6 in. "Claudegen" neon letters, a compliment paid to Sir Kingsley Wood by Air Signs, Ltd., the originators of this new method of sky advertising. The letters occupied the underside of each wing, the spread being 40 ft. Over 100 ft. of 11-mm. glass tubing was employed, each letter consisting of approximately 20 ft. Each letter was operated by a separate generator placed in the fuselage, and the generators were run from a 12-V battery. This installation was carried out by Claude-General Neon Lights, Ltd., an associated company of the G.E.C. A number of well-known proprietary products are expected to be advertised in this way all over the country during the next few months.

A neon display by aeroplane

E.D.A. Public Speaking Competition

The national finals of the E.D.A. Public Speaking Competition will be held on March 25th, commencing at 7 p.m., at Brettenham House, Lancaster Place, W.C. The entries this year numbered ninety men and twenty-four ladies, which is a record.

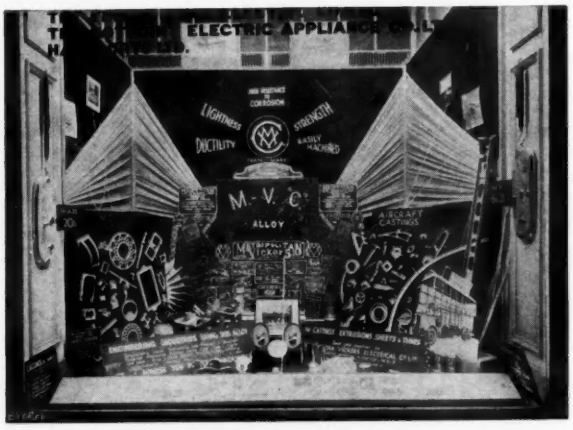
Bradford Contractors' Dinner

The annual dinner of the Bradford branch of the Electrical Contractors' Association was held on March 15th, Mr. H. Moss (chairman of the branch) presiding. Mr. G. H. Eady, M.P., in proposing the toast of the Association and officials, referred to the progress made in electrical development under the grid. Regarding the position of electrical contractors, he did not approve of always accepting the lowest tender. Work done by such firms was often unsatisfactory, as it was often done by people of little experience. Mr. R. Harrison-Watson, vice-president of the Association, who responded, said they were trying to educate the public to employ only those people who knew what they were doing. The Association had a

register of people who really knew their job. Mr. H. Moss, in proposing "The Guests and Visitors," referred to the importation of inferior and cheap apparatus, and said he would like to see a national "proving house" for electrical apparatus established and a stipulation that no apparatus should be installed which had not passed the requirements of that proving house. Ald. W. H. Barraclough and Mr. W. Dundas (deputy city electrical engineer) responded.

A Met.-Vick. Window Display

The latest display by the Metropolitan-Vickers Electrical Co., Ltd., at Crown House, Aldwych, shows applications of a special lightweight metal known as M-V "C" alloy, manufactured by the company. A varied selection of examples help



Lightweight metal exhibits

to show the wide range of applications; although it is mainly castings that are exhibited, the metal is suitable for extrusions, sheets and tubes. A comprehensive collection of cast nameplates of all sizes is shown. Such widely separated applications as motor bus frames, miners' hand-lamps, parts for aeroplanes, electrical machinery, trawlers, &c., are also represented.

Recent Contracts

The Chinese Ministry of Communications has placed a contract with the Marconi Co. for seven short-wave stations to form part of a network of new wireless communication services linking up the principal cities and commercial centres of China. The transmitters to be supplied are the "Type S.W.B.8." In addition to these new stations for internal communications in China, there is already in operation the Marconi beam station at Shanghai which provides external services between China and Europe and the United States.

The British Central Electrical Co., Ltd., informs us that during the last few months it has undertaken an appreciable amount of power-factor correction work for several firms, including the St. Albans Hosiery Mills, "X" Chair Patents Co., Ltd., Messrs. Griffiths & Diggins, and the New London Electron Works.

The Brush Electrical Engineering Co., Ltd., has received an order from Watford Corporation for a 15,000-kW c.m.r. Brush-Ljungstrom turbo-alternator. This will make the sixth turbo-alternator of this description supplied by the com-

Brush-Ljungstrom sets at Watford power station

pany to the Corporation, the five previous sets installed at Watford power station consisting of one 7,000-kW, one 5,000-kW, one 3,000-kW, and two 1,500-kW sets. Our picture shows the 3,000-kW, and two 1,500-kW Brush-Ljungstrom sets installed at Watford.

The International Marine Radio Co., Ltd., has been instructed to equip three ships of the Blue Star Line now being built by Harland & Wolff and Cammell Laird with its latest radio transmitters, crystal control short-wave equipment, auto-alarms and direction finders.

A *Reuter* message from Rio de Janeiro states that the contract between the Metropolitan-Vickers Electrical Co., Ltd., and the Brazilian Government for the electrification of part of the Central Railway of Brazil was signed on March 14th by the Ministers of Communications and Finance and representatives of the company. The value of the contract is about £3,000,000.

The English Electric Co., Ltd., has received an order from the G.W.R. Co. for a 300/350-h.p., 50-ton Diesel-electric shunting locomotive. This will be built in conjunction with Messrs. Hawthorn, Leslie & Co., Newcastle-on-Tyne, who will supply the mechanical structure, the English Electric Co. supplying the Diesel engine, generator, driving motors and control equipment. This locomotive will be identical with the ten at present under construction for the L.M. & S. Railway Co., the contract for which was placed with the English Electric Co. at the beginning of this year.

Employment During February

Employment in the engineering industry during February showed little general change in most sections, and continued moderate. Compared with a year ago, however, employment was better all round. Statistics published in the *Ministry of Labour Gazette* show that the number of unemployed was 127,070, a decrease of 141 as compared with the previous month, the percentage remaining at 13.2. In the electrical engineering section the number of unemployed was 7,054, as compared with 7,125, the percentage falling from 7.8 to 7.7 (11.7 per cent. in February, 1934). In the electric cable, apparatus and lamp manufacturing group there was an increase from 13,708 to 14,510, the percentage being 10.9, as against 10.3 in January (12.6 in February, 1934). Unemployment in the electrical wiring and contracting industry also showed a slight increase from 4,989 to 5,049, the percentage rising from 15.0 to 15.1 (16.8 per cent. in February, 1934).

A Battery Charger Display

Messrs. Selfridge & Co., Ltd., are displaying in their motor showrooms a car battery charger manufactured by Philips Industrial (Philips Lamps, Ltd.). This charger is designed for mounting on a wall of the owner's garage, and by plugging into a socket on the dashboard motorists are able to charge their batteries efficiently overnight without any risk of over-charging or short-circuiting. Either a 6-V or 12-V battery can be charged without any adjustment, as the charging rate is automatically controlled by a special regulator lamp. The rectifier is designed for a.c. mains.

Philips car battery chargers on view at Selfridge's

German Lamp Syndicate

The Reich Minister for Economic Affairs has made an order compulsorily binding into a syndicate the forty-five existing incandescent-lamp works, which are almost exclusively situated in Thuringia, producing lamps for pressures up to 30 V. A commissioner is to be appointed to fix a quota for each works and the prices for the inland market. The Osram Co., which also makes similar small lamps, is not included in the syndicate, nor is the export trade affected in any way. It is thought that the syndicate will form the basis for a connection with the European Glow Lamp Cartel.

Social Events

The first annual staff dinner and dance of the Telegraph Construction & Maintenance Co., Ltd., was held at the Abercorn Rooms, Great Eastern Hotel, E.C., on March 13th, Mr. L. J. Ransom presiding over a gathering of nearly 200 members and friends. In proposing the toast of "The Telegraph Construction & Maintenance Co., Ltd.," Mr. E. L. Watts (secretary) referred to the early days of the company, which was formed in 1864. The Atlantic was spanned by submarine telegraph cable in 1860, and succeeding years had seen practically every country in the world connected up by cable. There were now 500,000 miles of submarine cable laid, of which 80 per cent. had been made by their company. There had, however, been a falling off in the demand for these cables, and they had recently entered other fields of cable manufacture, particularly for power cables. Sir Geoffrey Clarke (managing director), referring to the company's entry into the power cable business, said that a successful business had been established in a short time. He paid a tribute to the loyalty of the staff. Mr. R. F. Harvey proposed the toast of the visitors, Mr. T. A. Kingham responding. Mr. J. N. Dean proposed "The Ladies," and Lady Clarke replied. Mr. C. J. C. Padfield proposed the chairman's health.

The annual carnival festivities of the employés of the English Electric Co.'s Stafford works were held recently, being spread over every night for one week. Each night the members of one of the departments were entertained, and on the final evening Mr. G. H. Nelson, chairman and managing director, was present. In a brief speech, he stressed the value of the loyal support of the employés to the efforts of the management in making the company a success.

Bruce Peebles' Concert Party and Orchestra gave performances of "Dick Whittington" in the Little Theatre, Edinburgh, on March 1st and 2nd. The entertainment, written and produced by Mrs. Rodger, wife of the chief engineer and works manager, and stage managed by Mr. G. Summers, attracted large and appreciative audiences. The stage settings and costumes gave a striking and colourful effect, and the children's speciality dancing proved a popular item. The entire cast was drawn from the company's employés, and the works orchestra was conducted by Mr. H. Woods, shops superintendent.

At the recent staff dance of British National Electrics, Ltd., over 200 persons were present, including representatives of the

At the British National Electrics Dance

The group includes: Mr. J. MacFarlane, secretary; Mr. J. Hepburn, secretary, Clyde Crane & Engineering Co.; Mr. J. Jardine, managing director; Sir James Lithgow, Bt., chairman; Mr. G. Laird, director; Mr. W. Beerling, general sales manager; and Mr. W. M. Marshall, Royal Bank of Scotland.

supply authorities, wholesalers and contractors in the West of Scotland. Some of the principal people who attended appear in the photograph which we reproduce herewith.

The G.E.C. Dramatic Society is presenting "Just Married," by Adelaide Matthews and Anne Nichols, at the Fortune Theatre, W.C., on April 8th and 9th. The profits from the two performances will be handed to the Infants' Hospital, Westminster.

The annual dinner of the Ipswich and District Electrical Association was held on March 14th at the Crown and Anchor Hotel, Ipswich, Mr. H. E. Blackiston (chairman) presiding. Mr. A. E. Knights (manager of Bury St. Edmund's electricity undertaking), in proposing the toast of "The Association," said it comprised electricity supply interests, manufacturers and contractors. This combination was necessary in the industry. In responding, Mr. Blackiston quoted figures showing the rapid development of the Ipswich electricity undertaking. In 1930-31 the sales of electricity totalled 21 million kWh, and the average price was 1.682d. per kWh. In 1934-35 the sales would total 37 million kWh, at an average price of 1.117d. per kWh. A "prosperity bonus" of 1s. per week would be given to transport men and all other employés whose wages were fixed by the District Joint Industrial Council as from April 1st next.

Illumination Design Course at Cardiff

The Lighting Service Bureau is holding an Illumination Design Course, under the auspices of E.D.A., at the South Wales Institute of Engineers, Cardiff, on March 28th and 29th. Lectures dealing with various aspects of lighting will be given by Messrs. W. J. Jones, J. W. Howell, H. Lingard and R. O. Sutherland, and Dr. A. B. Whitworth, and in the evenings inspections of lighting installations will be made. Those wishing to attend the conference should apply to Mr. E. J. Dowson, British Electrical Development Association, 2, Savoy Hill, W.C.

New Showrooms at Chesterfield

The new electricity showrooms of Chesterfield Corporation were formally inaugurated on March 13th by Ald. H. Varley, the Mayor, who said that five years ago the annual output of the electricity undertaking was 12¼ million kWh and it had risen to 18 millions. The number of consumers was over 15,000, and 85 per cent. of the premises in the area were taking a supply of electricity. The only parts not cabled were those where there was a possibility of the properties being demolished or condemned within the next ten years. Included among the consumers were 8,000 artisans' houses, the installations in which had been supplied by the Corporation under the hired wiring scheme. The showrooms include a basement which is used as a transformer sub-station and stores, a sales shop and office on the ground floor, an all-electric flat on the first floor, and a cookery demonstration room on the second floor. On the ground floor there is an extensive selection of cooking, heating and other domestic appliances, most of which can be hired out, but the chief attraction of the showrooms is the all-electric flat, illustrations of which appear on page 419. This includes a lounge, dining room, bedroom, kitchen and bathroom, and each room is divided from its neighbour by sliding partitions so that different combinations of rooms may be laid out from time to time. The demonstration room on the second floor will accommodate 100 people, and mounted on the demonstration platform are cooking, home laundry and other domestic appliances. The whole of the equipment of the building has been supervised by the consumers' superintendent, acting upon the instructions of Mr. D. H. Davies, the borough electrical engineer.

A Staff Pension Scheme

The Micanite & Insulators Co., Ltd., has put into effect a scheme of pensions and life assurance for male members of its staff between the ages of twenty and fifty. The total contributions of the employés amount to less than one-half the total cost of the benefits to be secured, and the scheme involves a considerable contribution on the part of the company.

Wages in the Engineering Industry

The Engineering Employers' Federation, at a joint conference held in London last week, rejected a claim submitted by the engineering trade unions last December for an all-round increase in wages of 2d. per hour, with a corresponding advance in piecework rates and the revision of the 1931 agreement regarding piecework, overtime and nightshift conditions. The employers suggested the appointment of small representative committees on each side to see if an arrangement capable of mutual recommendation could be found, and the unions agreed to this course. The conference was therefore adjourned.

Trade Announcements

The St. Austell & District Electric Lighting Co., Ltd., has removed its London office to 52, Queen Victoria Street, E.C.4.

In announcing the change of address of the Bristol depôt of Britannia Batteries, Ltd., in our March 8th issue, we inadvertently referred to it as the company's *British* depôt.

The Electric Construction Co., Ltd., has removed its registered office to Shell-Mex House, Strand, W.C.2. The works address remains unaltered.

Messrs. S. Wolf & Co., Ltd., have removed their registered office to Pioneer Works, Hanger Lane, Ealing, W.5 (telephone: Perivale 5631/2).

Brown Bros., Ltd., inform us that they are now marketing "Supreme" vacuum cleaners and floor polisher and "Ferret" hand cleaners.

For Sale

Salford Corporation has for sale d.c. meters.

Aldershot Electricity Department has for disposal d.c. motors, fans and other electrical apparatus.

(See our classified advertisements.)

Prices of Materials

Messrs. Henry Gardner & Co. report, March 20th. No change in the price of copper bars (best selected), sheet and rod. English pig lead £12 15s., 5s. inc.

Messrs. Edward Till & Co. report, March 20th: India rubber, Para fine, 4⅛d. (nominal).

New Catalogues and Lists

Superlamp, Ltd., 6, Paul Street, Finsbury Square, E.C.2.—A catalogue of lighting fittings.

The Magnetic Valve Co., Ltd., 43, Bloomsbury Square, W.C.1.—A folder on applications of the Magnetic valve.

Marconiphone Co., Ltd., 212, Tottenham Court Road, W.1.—A brochure on portable amplifying equipment.

Saxonia Electrical Wire Co., Ltd., Roan Works, S.E.10.—Details of cables suitable for Jubilee illuminations.

British Insulated Cables, Ltd., Prescot, Lancs.—A leaflet on steel-cored aluminium conductors for overhead power lines.

Holophane, Ltd., Elverton Street, Vincent Square, S.W.1.—Particulars of the latest type of shop-window reflector.

Falk, Stadelmann & Co., Ltd., 83, Farringdon Road, E.C.1.—A catalogue of Jubilee illumination devices.

Sun Electrical Co., Ltd., 118, Charing Cross Road, W.C.2.—Folders on new lighting fittings and Jubilee devices.

Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.—A pocket price list of motors and control gear.

General Radiological & Surgical Apparatus Co., Ltd., 204, Great Portland Street, W.1.—A catalogue of Siemens valve transmitters for ultra-short-wave therapy.

Furn-Art, Ltd., Sarnesfield Road, Enfield.—A brochure on Jubilee fittings.

Evershed & Vignoles, Ltd., Acton Lane Works, Chiswick, W.4.—Distant indication and control, particularly with reference to water undertakings, is discussed in a publication recently received.

C. H. Andrews, Ltd., 3, Cross Lane, Eastcheap, E.C.2.—A catalogue of materials and tools for overhead line construction.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A booklet entitled "How to Joint," and a folder on special 7/.029 in. cable for temporary illuminations.

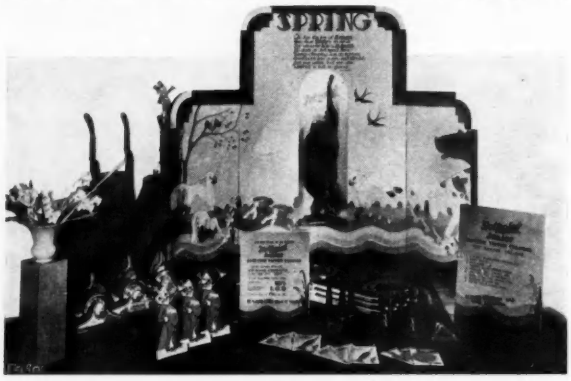
The Star Lampshade Mfg. Co., Kilmorie Works, S.E.23.—A leaflet drawing attention to the firm's lampshades.

Kandem Electrical Co., Ltd., 711, Fulham Road, S.W.6.—Particulars of a new Jubilee floodlighting unit.

Tudor Electrical Fittings Co., Ltd., 41, Hylton Street, Birmingham.—A catalogue of modern electric lighting fittings.

Bankruptcy Proceedings

G. Harding, The Grange, Barcombe, Sussex, formerly partner in a firm of electrical engineers, lately trading at 12, Emerald Street, London.—At the public examination herein held on March 13th at Brighton, it was stated that the liabilities amounted to £164 and there were no assets. Debtor said the business in which he had been interested was handicapped through shortage of capital. In March last year a meeting of creditors was held, when it was disclosed that the liabilities amounted to £3,746, and there was a deficiency of £3,214. Later a first and final dividend of 3s. 3d. in the £ had been paid on claims amounting to £2,772. The examination was adjourned for closing.



A vacuum cleaner display, designed to "tie-up" with spring cleaning, which the Hotpoint Electric Appliance Co., Ltd., has available for loan to electrical dealers

A. E. Humphreys, electrical engineer, 20, St. James' Square, S.W.—An application was made on March 14th at the London Bankruptcy Court for an order of discharge on behalf of this debtor who failed in July, 1927. The Official Receiver reported that the ranking liabilities amounted to £3,267 and the assets had realised £114. The failure was attributed to bad debts and heavy overhead charges. Unjustifiable extravagance in living was reported by the Official Receiver and the discharge was suspended for twelve months.

F. M. Crane, trading as C. S. Mayfield & Co., 67, Carshalton Road, Carshalton, and as the Sutton Electrical Installation Co., 38, Brighton Road, Sutton.—Application for discharge to be heard on April 17th at the County Court, Scarbrook Road, Croydon.

S. F. Philpott (S.F.P. Electrical Co.), electrical engineer, North Bar Works, Banbury.—Trustee, Mr. E. H. Goddard, Prudential Chambers, Banbury, appointed March 8th.

A. H. Duffin and **G. Kershaw** (A. H. Duffin & Co.), electrical engineers and contractors, Provincial Buildings, Conway Road, Colwyn Bay.—Last day for receiving proofs for dividend March 27th. Trustee, Mr. I. D. Hooson, St. Peter's Churchyard, The Cross, Chester, Official Receiver.

H. Pickup (Electrical & Wireless Stores), electrical engineer, 12, Frank Street, Barnoldswick.—Last day for receiving proofs for dividend March 28th. Trustee, Mr. J. O. Morris, 71, Manningham Lane, Bradford, Official Receiver.

G. E. Morris, wireless dealer, 46a, Newcastle Avenue, Worksop.—Last day for receiving proofs for dividend March 27th. Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield, Official Receiver.

H. V. Curtis, wireless and electrical engineer, 117, High Street, Dovercourt.—First meeting March 26th at 9, Arcade Street, Ipswich. Public examination April 29th at the Law Courts, Colchester.

F. Stead, wireless dealer, 1, Manchester Square, Otley.—First meeting March 25th at 24, Bond Street, Leeds.—Public examination April 2nd at the County Court House, Leeds.

C. Doherty, electrical contractor, 28a, New Cannon Street, Manchester.—Trustee, Mr. L. A. West, Byrom Street, Manchester, Senior Official Receiver, released March 8th.

G. S. Whiston, electrical engineer, 112, West Street, Crewe.—Last day for receiving proofs for dividend March 30th. Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester.

G. Y. Entwistle, electrician, 63, Shorey Bank Yard, Darwen.—First and final dividend of 4s. 0½d. in the £, payable March 26th at the Official Receiver's office, District Bank Chambers, Blackburn.

A. Clough, wireless dealer, 28, Town Street, Horsforth, near Leeds.—Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver, released February 26th.

E. C. Wood (Radio Equipment Co.), 15, Brook Street, Chester.—Trustee, Mr. I. D. Hooson, St. Peter's Churchyard, The Cross, Chester, released March 6th.

Company Liquidations

Reilly & Brookes, Ltd.—Winding up voluntarily.

Pettie & Co. (Electrical Engineers), Ltd.—Particulars of claims by March 30th to the liquidator, Mr. T. E. Clarke, 34, Castle Gate, Nottingham.

Harold Cooper & Son, Ltd.—Meeting April 16th at Victoria Chambers, Bowlalley Lane, Hull, to receive an account of the winding-up by the liquidator, Mr. E. P. Dutton.

Government Contracts

THE following contracts were placed by various Government Departments during February:—

ADMIRALTY.

Motor-generator alternators.—Small Electric Motors.

Fuse and indicating boxes.—Engg. & Lightg. Equipment Co.; Small Electric Motors.

Electric cable.—Anchor Cable Co.; B.I. Cables; Connollys; Ediswan; Enfield Cable Works; G.E.C.; W. T. Glover & Co.; Hackbridge Cable Co.; Henleys; Hooper's Telegraph & I.R. Works; I.R.G.P.; Johnson & Phillips; Liverpool Electric Cable Co.; Macintosh Cable Co.; Mersey Cable Works; Metropolitan Elec. Cable & Const. Co.; Siemens Electric Lamps & Supplies; T.C. & M. Co.; Ward & Goldstone.

Petrol-electric mobile crane.—Ransomes & Rapier. Sub-contractors for motors: Bull Motors.

Motors and starters for distilling machinery.—W. H. Allen, Sons & Co.

Fan units.—Mawdsleys. Sub-contractors: Davidson & Co., Thermotank & Veritys for fans. Electrical Apparatus Co., Small Electric Motors & Engg. & Lightg. Equipment Co. for control gear.

Fuseholders, &c.—L. Weekes (Luton); Engg. & Lightg. Equipment Co.; Phœnix Telephone & Electric Works; Dorman & Smith.

Incandescent electric lamps.—G.E.C.; Siemens Elec. Lamps & Supplies; B.T.H.

Electrical equipment for capstan lathes.—B.T.H.

Plugs and sockets.—Engg. & Lightg. Equipment Co.

Electrically driven pumps.—Drysdale & Co. Sub-contractors: Electro Dynamic Construction Co. for motors. Allen West & Co., E. N. Bray, Pulsometer Engg. Co. and Electrical Apparatus Co. for starters.

Signalling projectors.—Sperry Gyroscope Co.; Met.-Vick. Elecl. Co. Sub-contractors: Pilkington Bros.

Switchboards.—G.E.C.; Whipp & Bourne.

Switches.—G.E.C.; W. McGeoch & Co.; Engg. & Lightg. Equipment Co.; Player, Mitchell & Breeden; Telephone Manufacturing Co.; J. A. Crabtree & Co.

W.t. valves.—Mullard Radio Valve Co. Sub-contractors: Thermal Syndicate; H. W. Sullivan.

Welding resistances.—Whipp & Bourne.

WAR OFFICE.

Electric cable.—Siemens Bros.; Standard Telephones.

Generating sets.—R. A. Lister & Co.; W. H. Dorman & Co.

AIR MINISTRY.

Batteries.—Batteries, Ltd.; Britannia Batteries.

Direction finders.—Marconi's.

Switchgear.—Ferguson, Pailin.

POST OFFICE.

Telephonic apparatus.—Automatic Electric Co.; Ebonestos Insulators; Ericsson Telephones; G.E.C.; Siemens Bros.; Standard Telephones; Telephone Manufacturing Co.

Testing and protective apparatus.—Phœnix Telephone & Electric Works.

Cable.—Callender's; Connollys; Enfield Cable Works; United Telephone Cables.

Leclanché cells.—Ferguson Battery Co.; G.E.C.; Siemens Bros.

Loading coils.—G.E.C.

Telephone cords.—G.E.C.; L.P.S. Electrical Co.; Phœnix Telephone & Electric Works; Reliance Electrical Wire Co.; Siemens Bros.

Insulators.—Thomas de la Rue & Co.; Doulton & Co.; Litholite Insulators & St. Albans Mouldings.

Telephone lamps.—Ediswan; G.E.C.

Rectifiers.—Westinghouse Brake & Signal Co.

Transformers.—G.E.C.

Cabling and loading coils.—Portsmouth-Chichester: Standard Telephones. Bath-Chippenham-Devizes: United Telephone Cables. Sub-contractors for loading coils: Automatic Electric Co. Tunbridge Wells-Maidstone: Pirelli-General.

Cabling, loading coils and terminations.—Macclesfield-Hanley-Stafford: Standard Telephones. Leeds-Hull: Siemens Bros. Glasgow-Falkirk-Stirling: Pirelli-General.

Telephone exchange equipment.—Manningham (Bradford); Airdrie and Halfwayhouse (Glasgow); Fulford (York); Stanningley (Leeds): Automatic Electric Co. Wanstead: Ericsson Telephones. Sub-contractors: D.P. Battery Co. for batteries; Electric Construction Co. for motor-generators and ringing machines. Gipsy Hill (London); Evesham: G.E.C. Sub-contractors for Evesham: D.P. Battery Co. for batteries. Waxlow (London): G.E.C. Sub-contractors: D.P. Battery Co. for batteries: W. Jones & Co. for ringing machines. Hove; Attercliffe (Sheffield); Edinburgh Central; Gillingham; Morningside (Edinburgh); Birmingham Trunk, Toll and Central: Siemens Bros. Sub-contractors for Birmingham Trunk, Toll and Central: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for motor-generators and ringing machines. Doncaster: Standard Telephones. Sub-contractors: Hart Accumulator Co. for batteries; Electric Construction Co. for motor-generator; W. Jones & Co. for ringing machines. Trunk and East exchanges (London); Gerrards Cross: Standard Telephones.

Telephonic repeater equipment.—Gloucester: G.E.C. Whitchurch (Salop): Standard Telephones.

Ultra-short-wave radio telephone equipment.—Stranraer-Belfast: Standard Telephones. Sub-contractors: Electric Construction Co. for engine generator set.

H.M. OFFICE OF WORKS.

Wiring for electric lighting and power.—Natural History Museum, Entomological block: Davis, Myer & Co.

CROWN AGENTS FOR THE COLONIES.

E.h.p. and l.p. equipment.—Ferguson, Pailin.

Generating sets.—W. H. Allen, Sons & Co.; Ruston & Hornsby.

Mercury arc rectifier.—Hewittic Electric Co.

P.b. poles and cross arms.—Callender's.

Pole parts.—Siemens Bros.

Static transformers.—Brush Elecl. Engg. Co.

Electricity Supply

Lighting, Domestic, Power

Abercarn (Mon).—ELECTRICAL DEVELOPMENT HELD UP.—A large number of tenants of Council houses have applied for permission to have electric lighting and power installed, but the Council has decided to defer the applications for a year. It was stated that if some of the tenants were given electric lighting and power facilities all the tenants in the 700 to 800 Council houses would want it, which would mean a serious falling off in gas consumption, and consequent loss of revenue to the municipal undertaking.

Ayrshire.—COUNCIL HOUSE LIGHTING.—The Ayrshire County Council has decided to install electric lighting in sixty-four houses where at present gas is used. A councillor remarked that the tenants were " clamouring " for the change.

Batley.—NEW EQUIPMENT.—The Town Council has applied for a loan of £825 for e.h.v. extensions from the sub-station at Bradford Road West to Upper Batley Lane and £4,000 for transformer and switchgear plant, which will be required when the generating plant is taken out of service in March, 1936.

Bedford.—INSTALLATION OF WATER-HEATERS.—It has been the practice of the Electricity Committee to install water-heaters let out under the hiring scheme without charge, the work of fixing, plumbing and wiring having been executed by direct labour and partly by local electrical contractors, while the material was supplied by the Corporation. It is now considered desirable that the work should be carried out entirely by contract, and the Committee recommends the adoption, as from April 1st next, of a special schedule of charges.

PROJECTED WORKS.—Recently the Electricity Committee has approved the reinforcement of general supply mains at a cost of £11,000 and an expenditure of £12,935 on sub-stations and cables to meet the demands of potential consumers on various building estates in the area.

Brentford and Chiswick.—PURCHASE OF UNDERTAKING.—The Town Council is to purchase the local electricity undertaking of the Chiswick Electricity Supply Corporation, Ltd., at a cost of £281,375, with interest on the purchase price at the rate of 4½ per cent. per annum from January 1st, 1935, to the date of completion. The company will retain all other assets relating directly or indirectly to the undertaking, including the amounts owing by consumers, investments and cash at December 31st, 1934, and will discharge all liabilities relative to the undertaking as at that date. The company will retain the profits of the undertaking up to December 31st, 1934, instead of up to July 25th, 1934, the date originally specified. The undertaking will be handed over to the Corporation on completion, the date of which has been fixed provisionally as April 1st, 1935. In the meantime the business is being carried on by the company for the benefit and at the risk of the Corporation. The effect of the contract on the company's financial position is that, after paying a final dividend of 6 per cent., it will have at call a sum of £474,792. Notice has been given by the local authority to purchase the Aberystwyth undertaking of the company as at December 20th, 1935; no figures are included in the amount at call in this respect, as the price has yet to be ascertained. On the requisite sanctions being obtained to the provisional contract the company's accounts, which have been prepared for the full year (*i.e.*, up to December 31st, 1934), and which would allow of a final dividend of 6 per cent., less tax, being declared, will be issued as early as possible. It is also proposed then to take immediate steps to enable the first return of capital to be made. The directors recommend early acceptance of the offer.

Buckie.—REDUCED CHARGES.—The Town Council has reduced the domestic two-part tariff " unit " charge from 1½d. to ¾d. per kWh. The price of electricity has been reduced in each of the past four years.

Cardiff.—NEW TARIFF.—For consumers not qualified for the bulk supply tariff the following block power rates are to be charged: For the first 40,000 kWh per annum, 1d. per kWh, above, ¾d. per kWh.

Colchester.—EXTENSIONS.—The City Council is to reconstruct the l.v. distribution system at Mile End and to make an extension of the overhead lines in Boxted Road at an estimated cost of £2,894.

Dorchester.—NEW TARIFF.—A sliding scale for power of 2d. per kWh for the first 2,500 kWh and 1½d. beyond has been introduced by the Town Council.

HIRE-PURCHASE SCHEME.—A scheme for the sale of cookers and water-heaters on the hire-purchase system has been adopted, and a loan of £1,000 is desired for the purpose.

Dover.—REDUCED METER RENTS.—The Town Council has reduced meter rents. For the next financial year the reduction amounts to £1,100.

Horndean.—STREET LIGHTING.—Portsmouth Electricity Department is to provide street lighting in the Horndean district.

Leatherhead.—STREET LIGHTING.—A scheme prepared by the surveyor for the lighting of various streets has been approved in principle by the Urban District Council.

Linton (Cambs).—ELECTRICITY AVAILABLE.—An electricity supply is now available for the village from the Bedfordshire, Cambridgeshire & Huntingdonshire Electricity Co.

London.—DEPTFORD.—The Housing Committee has made arrangements for the installation of electric lighting in houses on the Brockley Estate. These facilities will only be available in the Deptford portion of the estate. Tenants in the Lewisham area are to be circularised to ascertain if they require electricity on the same terms.

ISLINGTON.—Bitumen-insulated cables are to be replaced by the lead-covered paper-insulated type at a cost of £1,280, and rubber-insulated cables are to be replaced at a cost of £7,200. The borough electrical engineer states that it is desirable to provide h.v. mains in certain districts at a cost of £5,050.

Inquiries are made from time to time by consumers as to the terms upon which they can purchase installations made under the rental wiring scheme. At present the consumer is always charged the original cost, but the Electricity Committee recommends that consumers should be allowed to purchase rental wiring installations for the original cost of the installation, with a deduction of 10 per cent. for each completed year of service, one-fifth being charged after eight years.

L.C.C.—The Council is to install or renew electric lighting at the following institutions: St. David's Hospital, Edmonton (£2,340); Goldie Leigh Hospital, Abbey Wood (£1,800); White Oak Hospital, Swanley (£2,800); and Park Hospital, Hither Green (£2,100).

SHOREDITCH.—The Electricity Committee recommends a reduction of the flat-rate charge for lighting from 3½d. to 3d. per kWh.

FULHAM.—The Electricity Committee has recently made arrangements for the establishment of a department to carry out the wiring of consumers' premises at the expiration in July of the present arrangements with contractors.

An expenditure of £3,000 has been authorised for the purchase of multi-coin slot meters, and cables are to be extended at a cost of £6,746.

Lymington.—REDUCED LIGHTING RATE.—The charge for electricity for lighting has been reduced by 2d. per kWh to 10d.

Mediar-with-Wesham (Lancs).—ELECTRIC LIGHTING.—The Parish Council has approved the conversion of street lighting from gas to electric.

Morcott.—PROSPECTS OF SUPPLY.—Overhead lines are now being erected in preparation for supplying the village with electricity.

Musselburgh.—ELECTRICITY FOR COUNCIL HOUSES.—The Council has decided to allow tenants of its houses to have electricity installed by the Musselburgh & District Electric Light & Traction Co., Ltd., under the assisted-wiring scheme.

Newcastle-on-Tyne.—GRID SCHEME AGREEMENT.—After negotiating for more than two years the Electricity Committee has reached an agreement with the Central Electricity Board and the North-Eastern Electric Supply Co., Ltd., regarding the taking over of the Manors power station under the grid scheme. The Committee, in a report, states that the C.E.B. had challenged the status of the Council as authorised undertakers, and although the Committee had originally intended to seek legal advice on this question, it had later reached an agreement with the Board and the Supply Co. Under the agreement the Board would pay to the Corporation £32,500, all operating costs above the first £2,558 a year, plus £1,460 a year establishment charges. The Board would also provide a bulk supply at £3 10s. per kW, plus 0.2d. per kWh on the basis of fuel at 14s. per ton, and would extend supplies in the city under the same terms. This latter provision is made to protect the City Council if it exercises its option to purchase the electricity undertakings in the city in 1937. The terms of the agreement with the Supply Co. provide that all plant and apparatus belonging to the Corporation (other than the generating plant) shall be altered or replaced to make it suitable for 50-cycle supply, the cost being met by the Board. The Electricity Committee stated in the report that

A pier lighting installation carried out by the Madeira Electric Light & Power Co., Ltd., at the Port of Spain, Trinidad, with G.E.C. equipment. Type " P.L.A." lanterns housing 500-W lamps were used

unless these terms were accepted it would be faced with an expenditure of £38,000 for new boiler plant and £39,000 for turbines.

Paisley.—NEW EQUIPMENT.—Application has been made by the Council for sanction to borrow £5,000 for meters, £5,000 for hired installations, £5,000 for appliances, £5,000 for mains extensions and services, and £10,627 for specified distribution extensions. Under the Corporation hired-wiring scheme 1,595 installations have been made in the last nine months, and the total number connected is 7,807. Distribution extensions include Gallowhill housing estate (£9,114) and the Infectious Diseases Hospital (£688).

Penrith.—THRELKELD SUPPLY.—The Mid-Cumberland Electricity Co. proposes to extend its supply to Threlkeld.

Plymouth.—CABLE WORK.—Cable extensions costing £3,010 are to be undertaken by the Electricity Committee.

Redbourn.—SUB-STATION.—The North Metropolitan Electric Power Supply Co. proposes to erect a sub-station at Church End.

Retford.—SUPPLY TO BABWORTH.—The Town Council is to supply electricity to Babworth.

Romsey.—OVERHEAD LINES.—The West Hampshire Electricity Co., Ltd., proposes to erect overhead lines in the parishes of Romsey Extra, Michelmersh, and Mottisfont.

Trial electric and gas lamps were suggested, but it was stated that the two could not be compared.

Scotland. — ELECTRIFICATION. — British and International Utilities, Ltd., London, intends to build generating plant at Campbeltown, Tarbert, and Lochgilphead, and to introduce electricity to these towns, as well as to Ardrishaig, Furnace, Minard, and Crarae. The work of laying lines and installing machinery will begin almost immediately.

Skipton.—CHEAPER RURAL LIGHTING.—The Rural District Council has been informed that the Electrical Distribution of Yorkshire, Ltd., proposes to reduce its domestic lighting charge from 6½d. to 5½d. per kWh.

Stoke-on-Trent.—INSPECTION OF INSTALLATIONS.—The Electricity Committee has made arrangements to inspect wiring installations by contractors while the work is being carried out.

Swansea.—ALTERNATOR WANTED.—Tenders are to be invited for the supply of a 750-kW Diesel-driven alternator.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains to a sub-station to be erected at Derwen Fawr at a cost of £1,130, and to a proposed sub-station at Mayhill at a cost of £2,180.

Switzerland.—THE DIXENCE VALLEY SCHEME.—The Dixence Valley hydro-electric plant which has just been put into partial operation consists of a central station with a head of 1,750 metres (said to be the highest in the world). The dam, when

The Dixence Dam in course of construction. Left: Belt and pipe used for bringing concrete to the site. Right: The base of the dam

Rushden.—STREET LIGHTING.—Electric lighting by centrally suspended lamps is to be installed along the whole length of the main thoroughfare. The tender of the Rushden & District Electric Supply Co., Ltd., of £778 for the supply of fifty-one standards fitted ready for use, has been accepted.

completed, will measure about 450 m. on the summit and will be 85 m. high, with a base 70 m. thick. It will form a solid mass of, roughly, 400,000 cu. m. of gneiss-coated concrete, the cement being brought up from Sion by telpherage. The lake formed by the dam, when completely filled, will

The Royal Jubilee Celebrations

MANY more plans for celebrating the Royal Jubilee with floodlighting and illuminations have been announced during the past week. Mr. F. Swarbrick, the borough electrical engineer and manager of Hove, informs us that the Kingsway and the Esplanade will be decorated and illuminated with coloured lights. The Brunswick lawns and portions of the Western lawns and the lagoon will be floodlighted and the Town Hall will be decorated and illuminated. The Council has invited the residents to light their premises, and has offered a tariff of 1d. per kWh for all electricity used for outside lighting and floodlighting from May 1st to September 30th. A concession is also being made for the extra electricity used by the Corporation. Arrangements have been made for the Lighting Service Bureau to give demonstrations early in April.

The Leicester Tramways Committee has decided to spend £150 on decorating cars and buses and permission has been given for the Corporation to decorate tram standards. At Leeds the City Council has approved the floodlighting of the Town Hall, Civic Hall, Kirkstall Abbey, and Templenewsam Mansion. Littlehampton is to spend £598 on festoon lighting along the Promenade and Arun Parade. Barnoldswick Urban District Council has decided to supply electricity for outside lighting of shops and buildings at 25 per cent. less than the usual tariff. At Morley (Yorks) and Brightlingsea there will be floodlighting. Winchester City Council has approved a charge of 1d. per kWh for special Jubilee decorative illuminations and floodlighting (not for advertisements), with a charge of 7s. 6d. for a meter. Dewsbury Electricity Committee has agreed to supply electricity without charge for illuminations and for exterior lighting by private persons at 1d. per kWh.

Lighting improvements are to be carried out at Hinckley Market Place and elsewhere in connection with the celebrations, and it is proposed to floodlight the Moore Memorial Fountain at Wigton. The fountain outside the Council Offices is to be electrically illuminated at Sevenoaks, while at Bedford it is proposed to spend £500 on illuminations.

The Walton and Weybridge Electricity Department has been authorised to spend up to £100 on illuminations and decorations and Windlesham Church and the Bagshot, Lightwater and Windlesham War Memorials are to be floodlighted. Illuminations will be carried out at Swaffham Market Place.

The Settle and District Electricity Co., Ltd., is offering electricity for illuminatons at a penny per kWh, plus 5s. for meter rent. Warrington Electricity Department is to charge ½d. and Chippenham 1½d. per kWh for electricity required for special illuminations. At Douglas (I.o.M.) the Electricity Committee offers a special rate of ¾d. per kWh for decorative illuminations and floodlighting and has agreed to give a quarter's electricity without charge as first, second and third prizes in a competition to be arranged for the best decorated dwelling house.

In London, Shoreditch Electricity Committee has approved a plan for floodlighting and illuminating the office and showrooms at a cost of £235, and has decided to retain the apparatus as a permanent advertisement. Electricity used for the flood-lighting of buildings and general outdoor illuminations is to be charged for at the special rate of 1d. per kWh. The Islington Committee recommends special rates. Hammersmith Borough Council has formed a Decorations Sub-Committee which includes a representative of the Osram-G.E.C. Lamp Works.

We are informed by Mr. A. L. Trundle, manager and secretary of the Kensington and Knightsbridge Electric Lighting Co., Ltd., that from May 1st to June 5th, inclusive, electricity will be available for floodlighting at ¾d. per kWh, subject to a minimum of 10s. 6d.

Mr. S. Tillotson, borough electrical engineer, states that the West Hartlepool Electricity Department has offered a tariff of ½d. per kWh for temporary illuminations provided they are installed by authorised electrical contractors who will render a statement of the installation to the borough electrical engineer. Cardiff is spending about £3,200 on floodlighting and illuminations for the celebrations, and Wolverhampton will purchase fifty-two floodlighting projector equipments with which to illuminate public buildings.

have a capacity of 50,000,000 cu. m. From the lake water is forced through a 12-km. tunnel driven through the rock. Dual water pipes then lead to the power station at Chandoline, near Sion, 1,750 m. below. The power station contains five principal groups of generators, one a reserve and one auxiliary. At the present moment three groups and the auxiliary are functioning. Each consists of one three-phase generator of 30,000 kW, turned by two single-jet Pelton turbines of 21,250 h.p. The installation is constructed to give a total power of 133,250 kW to the terminals of the boosters. The construction of a road, a funicular railway and six telpherages was necessitated by the enterprise.

Southampton.—REVISED TARIFFS.—It is estimated that there will be a net profit of £18,000 for the year ending March 31st next, and a sum of £13,500 is to be offered for rate relief. Tariff modifications are also proposed, including the following: "All-in" domestic tariff, alternative standing charge based on the net rateable value of the consumer's premises, payable quarterly at the rate of 2½ per cent. within the borough and 3½ per cent. outside. It is recommended that the business tariff shall be extended so as to include all classes of consumers other than those covered by the "all-in" domestic tariff. For power, where not covered by the business tariff and for accumulator-charging where not covered by the new electric-vehicle charging tariff, reductions are recommended from 1½d./1d. to 1d./¾d. per kWh within the borough and 1½d./1⅛d. to 1¼d./1d. per kWh outside. It is recommended that for all electrical energy consumed between the hours of 8 p.m. and 8 a.m. in charging electric vehicles the charge shall be ½d. per kWh (minimum £10 per annum) within the borough and ¾d. per kWh (minimum £15 per annum) outside the borough. For traction energy would be reduced from 0.8d. to 0.75d. per kWh, and for public lighting outside the borough from 3d. to 2d.

Torquay.—AREA EXTENSION.—The Electricity Commissioners have now issued an Order making fully operative the Special Order granted to the Corporation by Parliament which has extended the Corporation's area of supply to include the borough of Totnes.

Upholland.—SUPPLY TO CRAWFORD.—The Council has decided to approach the Wigan Electricity Committee with a request to extend its underground cables from Chequer Lane End to Crawford before the end of next September, and promises to assist the Corporation in encouraging owners of property and tenants to use electricity. The Council's action follows a canvass of the area.

Watford.—LIGHTING IMPROVEMENTS.—The Town Council has applied for a loan of £10,000 for improving public lighting.

Whitehaven.—UNDERTAKING TO BE RETAINED.—The Finance Committee has informed the Mid-Cumberland Electricity Co., Ltd., that the Corporation is not desirous of disposing of the electricity undertaking.

Wigtownshire.—LIGHTING INSTALLATIONS.—Electric lighting is to be installed in all the police stations in the county where a supply is available.

Traction

Australia.—CABLE TRAMWAY CONVERSION.—The Melbourne and Metropolitan Tramways Board has decided to electrify the North Melbourne tramway cable route (about 1½ miles long) at a cost of £120,000. The work will be commenced in August, when the electrification of the Brunswick route, the original estimate for which was £500,000, including forty new tramcars, is completed. It is expected that the North Melbourne route will be finished early next year.

Belgium.—RAILWAY ELECTRIFICATION.—It is reported that the Belgian State railway authorities are preparing plans to electrify the line between Brussels and Luxemburg.

Bolton.—TROLLEY-BUSES REPLACE TRAMS.—Trams on the Bolton to Four Lane Ends route are to be superseded by trolley-buses.

Corby.—ELECTRIC RAILWAY.—Electric freight trains are now running on an underground electric railway installed at Messrs. Stewarts & Lloyds' new steelworks at Corby.

France.—PARIS RAILWAY SCHEME.—According to *Modern Transport*, a proposal has been made to use a portion of the tracks of the now disused belt railway around Paris. This track, which runs entirely around Paris near the limits of the city, would be electrified and connected to the underground network. In this way the construction of new underground lines could be avoided.

Italy.—AN ELECTRIC SNOW REMOVER.—In a recent issue of *Revista Tecnica delle Ferrovie Italiane* particulars are given of the electrical installation which has been carried out at the new central railway station at Milan for clearing snow from 400 railway points. In the vicinity of each of the points is fixed an electric heating element enclosed in a D-section copper sheath, the flat side of which is secured to the side of the rail by means of cams. During the winter of 1933-34 the installation was brought into operation over a period of 92½ hours, during which the amount of power used was 127 kWh, the heating elements melting snow from the points at the rate of about 35 millimetres per hour.

NAPLES LINE TO BE ELECTRIFIED.—The Southern Secondary Railway Co., which owns the electrically worked Circumvesuviana Railway, has purchased the Naples-Baia line, and intends to electrify the whole 23 miles at a cost, including extensive realignment works in the suburbs of Naples, of £150,000.

Newport.—OFFER OF PURCHASE REFUSED.—The Town Council has decided not to entertain a proposal of the Western Welsh Omnibus Co., Ltd., to purchase the municipal tramway undertaking.

Portsmouth.—TROLLEY-BUS APPLICATION WITHDRAWN.—The City Council has agreed to withdraw its application to the Minister of Transport for a Provisional Order to operate trolley-bus services in so far as it refers to the routes from the Cosham terminus to the city boundaries.

South Shields.—AN UP-TO-DATE TRAM.—A new 62-seater tram of the latest type is to be bought by the Town Council for approximately £2,000. It has a central entrance.

Sunderland.—NEW TRAMS.—The Town Council is to purchase new tramway rolling stock at a cost of £5,757.

United States.—NEW YORK.—The Brooklyn-Manhattan Transit Corporation's lines, power plant and transport facilities are to be sold to the New York Municipality for £37,000,000.

PETROL-ELECTRIC TROLLEY-BUSES.—Sixty-two "all service" type petrol-electric buses, the first of their kind in the world, were recently ordered by Public Service Co-ordinated Transport, according to the Chicago *Electric Traction & Bus Journal*. This type of bus may be operated either from overhead trolley wires or under its own power. The vehicles will seat thirty-six passengers, and will have all-metal bodies of lightweight streamlined construction with a side exit door. There are three independent braking systems, namely, air, manual and electric.

Communications

Australia.—AUTOMATIC TELEPHONES.—The Australian Postal Department anticipates that the whole of the telephone system of the Melbourne metropolitan area will be controlled by automatic exchanges by 1950. In the city and main suburban areas the change will be completed by 1945. At the end of December last there were 44,265 subscribers on automatic exchanges and 27,639 on the manual system.

France.—TELEVISION.—According the the *Wireless World*, a Television Committee has been set up. It is proposed that television transmissions should take place with 180-line horizontal scanning at 24 frames per second. The French Postal Administration has ordered an experimental television transmitter working on ultra-short waves.

Great Britain.—NEW B.B.C. STATION SITE.—The British Broadcasting Corporation has been carrying out experiments at Edmundbyers in connection with its search for a suitable site for the new North-East Regional station.

India.—PROFIT ON TELEPHONES.—A report of the Indian Telegraph Department states that the telephone system made a net profit during 1933/34 of Rs.2,73,000, compared with Rs.2,28,000 in the previous year. The increase was chiefly due to the growing popularity of the trunk telephone service and to the extensions made, especially in South India. The carrier system has been superimposed on several long-distance trunk circuits. Owing to the number of calls between Calcutta and Bombay having nearly doubled, a project has been sanctioned to install a three-channel carrier telephone on this circuit. Additional telephone repeaters at intermediate stations have also been installed, and the use of measuring instruments in the main telephone exchanges has been extended.

'PHONE TO CEYLON.—The Indo-Ceylon telephone line was opened to the public on March 15th.

BROADCASTING.—*The Times* Delhi correspondent reports that the Government has announced the creation of an Office of Broadcasting, under an officer designated the Controller of Broadcasting. Pending the appointment of a controller, the existing Director of Wireless, Mr. P. J. Edmunds, will undertake the duties. The decision is viewed as a natural consequence to the proposal made by Sir James Grigg, the Finance Member, in his Budget speech, when he set aside 20 lakhs of rupees (£150,000) for the development of broadcasting in India.

Russia.—TELEVISION.—It is reported in the *Moscow News* that a successful demonstration of Soviet-made television apparatus took place recently. At present television in the Union is broadcast on long waves, but the Commissar for Communications stated that ultra-short-wave television apparatus will be set up in Moscow this year. It is proposed to install receivers in public parks, clubs, &c.

Scotland.—RADIO LINK WITH ISLES.—Remote islands in the North of Scotland are now provided with telegraphic facilities by means of radio-communication. This is stated in the 1934 report on the telegraph and telephone services for the Aberdeen district, which adds that under this arrangement a short-wave radio link had been established between Housay Post Office (Whalsay Skerries) and Lerwick coastguard station, over which telegrams are transmitted and then repeated to or from Lerwick Post Office. The question of extending the system is under consideration.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aldershot.—April 2nd. Electricity Department. E.h.p. and l.p. cable, and prepayment meters for the year ending March 31st, 1936. (See this issue.)

Australia.—Brisbane.—City Electric Light Co. May 14th. Oil immersed self-cooled outdoor type transformer. (A.Y. 12948.)*
Melbourne.—State Electricity Commission. April 29th. Porcelain insulators. (A.Y. 12966.)*
Posts and Telegraphs Department. May 14th. V.i.r. l.c. cable. (A.Y. 12965.)*

Bath.—Electricity Department. Cables, joint boxes, fuse boxes and meters. (See this issue.)

Batley.—Waterworks Department. Electrical starting gear for small pumping set, pneumatic compression tank and compressor. Specifications, &c., from the water engineer, Waterworks Offices, Woodwell.

Bexhill.—March 30th. Electricity Department. Collection, conversion and re-installation of d.c. wireless apparatus. (See this issue.)

Bexley.—March 30th. U.D.C. Two banks of Scott-connected transformers and switchgear kiosk.

Bridlington.—March 25th. Corporation. 50-kVA transformer. (March 15th.)
April 3rd. Electricity Department. L.p. cables for the year ending March 31st, 1936. (See this issue.)

Coventry.—April 18th. Education Authority. Machinery, tools, apparatus and equipment for new technical college. (See this issue.)

Dundee.—April 4th. Electricity Department. General engineering stores for one year. Specifications, &c., from D. H. Bishop, general manager and engineer, Dudhope Crescent Road; tenders to town clerk.

Durham.—April 1st. County Mental Hospital Visiting Committee. Deep well, borehole turbine pump with electric motor, and sinking borehole. (March 15th.)

Ealing.—March 29th. Electricity Department. Meters. (See this issue.)

Glasgow.—March 23rd. Public Health Department. Annual contracts, including electrical fittings, for hospitals, &c. Forms, &c., from Superintendent of Stores, 23, Montrose Street; tenders to town clerk.

Gloucester.—March 30th. Electricity Department. Rotating standard meter test bench. (See this issue.)

Gravesend.—March 23rd. Borough Council. 400-kVA transformer. (March 8th.)

Great Western Railway.—April 4th. General stores. (March 8th.)

Halifax.—April 8th. Housing Committee. Various works, including electrical, at houses on the Pye West (ninety-eight) and the Ling Bob (twenty-eight) housing schemes. Specifications, &c., from the borough engineer, Crossley Street (deposit £2 2s.); tenders to the town clerk.

Heckmondwike.—April 5th. Electricity Department. Plant and cables, meters, &c., in connection with the proposed change-over. (March 15th.)

Huddersfield.—March 25th. Corporation. Mercury-arc rectifier. (March 15th.)

Kidderminster.—March 25th. Worcestershire Education Committee. Electric lighting installation at the School of Science and Art. Particulars from the School Committee.

King's Lynn.—April 6th. Electricity Department. Supply and laying of 11,000-V cable. (See this issue.)

Lanark.—County Council. Various work, including electric lighting, at sixty houses at Blantyre and Bellshill. Particulars from P. C. Smith, county housing and town planning engineer, Hamilton, by April 2nd.

Littleborough.—March 29th. Electricity Department. Meters for the year ending March 31st, 1936. (March 15th.)

London.—St. Pancras.—April 4th. Electricity Department. One 100-b.h.p. oil-driven engine and d.c. generator. (March 15th.)
Fulham.—April 17th. Borough Council. Two (or three) electrically operated luffing, slewing and travelling portal jib cranes (Section "N"). Specifications, &c., from borough treasurer, Town Hall (deposit £5 5s.); tenders to the town clerk.
H.M. Office of Works.—April 4th. Steel conduit tubes and fittings. (See this issue.)
London & Home Counties J.E.A.—April 8th. Annual supply of general electrical accessories. (See this issue.)

Manchester.—March 29th. Electricity Committee. Pipework, valves and traps, and de-superheater plant for Stuart Street power station. (March 15th.)

Newport (Mon.).—March 25th. Electricity Department. 250-kW 3-phase rectifier equipment. (March 8th.)

New Zealand.—Auckland.—May 28th. Harbour Board. Four electric semi-portal jib cranes and spares. Specification from C. R. Butters, 4/5, Wood Street, E.C.2 (deposit £2 2s.).
Dunedin.—Corporation Tramways. April 26th. Feeder cable. (A.Y. 12964.)*
Wellington.—Public Works Tenders Board. June 25th. Three 1,500-kVA single-phase transformers. (A.Y. 12963.)*

Peterborough.—April 2nd. Education Committee. Electric lighting at the Folbridge Council school. Particulars from S. Dodson & Son, architects, Museum Buildings, Priestgate, by March 25th (deposit £2 2s.).

Plymouth.—March 23rd. Electricity Department. Wireless rectifiers for the period ending March 31st, 1936. (March 15th.)

Rosslynlee.—March 30th. Midlothian and Peebles District Asylum Committee. Electrical fittings, &c., for the asylum. Forms from the clerk and treasurer, 19, Heriot Row, Edinburgh.

Salford.—March 25th. Corporation. Mercury-arc rectifiers, transformers, switchboard and switchgear. (March 8th.)

Scarborough.—March 25th. Town Council. Electric lighting installation for 208 houses. (See this issue.)

South Africa.—Pretoria.—Union Tender and Supplies Board. April 19th. Magneto cordless-type telephone switchboards. (A.Y. 12967.)*

Stoke-on-Trent.—April 3rd. N.W. Midlands J.E.A. Meters. (March 15th.)

Sutton Coldfield.—Town Council. Conversion of fixed time automatic traffic signals at New Oscott, to vehicle-actuated type. Particulars from borough engineer.

Taunton.—March 29th. Electricity Department. E.h.p. metal-clad switchgear. Particulars from borough electrical engineer (deposit £1).

Uruguay.—Montevideo.—State Electricity Supply & Telephone Administration. April 22nd. Auxiliary telephone apparatus. (A.Y. 12951.)*
April 24th. Lead-covered telephone cable. (A.Y. 12952.)*

Wakefield.—March 25th. West Riding County Council. L.p. hot water apparatus and electric lighting at Otley Newall Infants' new school and heating and electric lighting at Hemsworth Senior Mining Centre. Specifications, &c., from the education officer, County Hall; tenders to the clerk of the County Council.
April 1st. West Riding Public Assistance Committee. Internal telephone system at the Penistone institution. Specifications, &c., from P. O. Platts, West Riding architect, County Hall.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bedford.—Electricity Committee. Accepted. Cable. Siemens Bros. & Co., Ltd.; Macintosh Cable Co., Ltd. Switchgear (£153).—Brookhirst Switchgear, Ltd.

Bexhill.—Electricity Committee. Recommended. Meters.—British Sangamo Co. Kiosk and control gear (£112).—Crompton Parkinson, Ltd. Transformers for sub-stations (£775).—British Electric Transformer Co., Ltd.

Birmingham.—Electric Supply Department. The note regarding accepted meter tenders which appeared in our last issue related to orders placed during the past quarter. We are now informed that during the same period Messrs. Chamberlain & Hookham, Ltd., received orders for upwards of 5,000 meters.

Croydon.—Town Council. Recommended. One petrol-electric crane (£740).—Ransomes & Rapier, Ltd.

Dorchester.—Electricity Committee. Recommended. Oil switch (£130).—British Thomson-Houston Co., Ltd. Switch cubicle (£167) and 700-kVA transformer (£238).—Electric Construction Co., Ltd.

Dumfries.—Electricity Committee. Recommended. Cable for the Loganbarns kiosk site (£236).—Johnson & Phillips, Ltd. Kiosk sub-station for Loganbarns (£272).—Crompton Parkinson, Ltd.

Egypt.—Egyptian State Railways. Accepted. Battery materials.—Siemens Bros. & Co., Ltd. (£499); General Electric Co., Ltd. (£325); Imperial Chemical Industries, Ltd. (£60).

India.—Indian Stores Department. Accepted. H.p. cable.—Standard Telephones & Cables, Ltd. Outdoor h.p. boxes and h.p. joint boxes.—General Electric Co. (India), Ltd.

Inverness.—Electricity Committee. Recommended. Meters.—Ferranti, Ltd. (£392); Chamberlain & Hookham, Ltd. (£392).

Llanfairfechan.—U.D.C. Accepted. Wiring premises under the assisted scheme for one year.—H. Ll. Jones (Dolwen).

London.—St. Pancras.—Contracts and Stores Committee. Recommended. One battery for an electric vehicle (£143).—Chloride Electrical Storage Co., Ltd. Ninety electric cookers (£855).—Hotpoint Electric Appliance Co. Ninety electric fires (£244).—Simplex Electric Co., Ltd. Eighteen convectors (£57).—Belling & Co.
Stoke Newington.—Electricity Committee. Recommended. For the Victoria Road sub-station: Transformers and control gear (£2,248).—General Electric Co., Ltd. Switchgear (£2,330).—Harland Engineering Co., Ltd. For twelve months ending March 31st, 1936: L.p. cables.—Henley's. Electric kettles.—Bulpitt & Sons, Ltd. Meters.—Venner Time Switches, Ltd.; Chamberlain & Hookham, Ltd.

South Africa.—Railway and Harbours Administration. Accepted. Five 1,200-h.p. electric locomotives for the Natal section of the railways.—Metropolitan-Vickers Electrical Co., Ltd.

South Shields.—Town Council. Accepted. Electrical installations in 148 houses in Wenlock Road.—Electrical Services and Repairs Co.
Transport Committee. Accepted. Central entrance tramcar body (£1,563).—Brush Electrical Engineering Co., Ltd.

Swansea.—Electricity Committee. Accepted. For twelve months: Cable.—Callender's; Pirelli-General. Meters and demand indicators.—Siemens Elec. Lamps & Supplies; Price &

Belsham, Ltd.; R. Hornby & Co., Ltd.; Reason Manufacturing Co., Ltd.; Ferranti, Ltd.; Aron Electy. Meter, Ltd.; Electrical Apparatus Co., Ltd.; Metropolitan-Vickers. Motors and starters.—Brook Motors, Ltd.; Morecambe Electrical Equipment Co., Ltd. Time switches.—Horstmann Gear Co., Ltd.; G.E.C.; Metropolitan-Vickers. Transformers.—Hackbridge Elec. Construction Co., Ltd. Copper strip, bar and tubes.—Callender's; Hudson & Wright, Ltd. Electrical fittings and wiring.—G.E.C., Ltd.; Falk Stadelmann & Co.; Woodhall & Partners (1929), Ltd.; Westward Electrical Co. (1928), Ltd.; Simplex Electric Co., Ltd.; B.I. Cables, Ltd.; Metallic Seamless Tube Co., Ltd.; Electrical Components, Ltd.; Electrical Conduits, Ltd.; Siemens Elec. Lamps & Supplies, Ltd.; Revo Elec. Co., Ltd.; J. H. Tucker & Co., Ltd.; Electric Lamps & Supplies Co., Ltd.; G. Bray & Co., Ltd.; Lighting Trades, Ltd.; Sloan Electrical Co., Ltd.; Santon, Ltd.; Enfield Cable Works, Ltd. Duplicate 10,000-kW transformer (£5,600).—Hackbridge Elec. Construction Co., Ltd. 33,000-V switchgear equipment (£4,330).—Ferguson Pailin, Ltd.

Thurso.—Accepted. Wiring of eighty-two Council houses (£332).—Finlayson & Co.

Wakefield.—Housing Committee. Accepted. Wiring 156 Council houses.—H. Goodyear.

Forthcoming Events

Birmingham Electric Club.—Friday, March 22nd. Grand Hotel, Birmingham. 7 p.m. "Specifications." Mr. F. M. Lea.

Royal Institution.—Saturdays, March 23rd and 30th. Institution, London. 3 p.m. "Electromagnetic Radiations." Lord Rutherford. Friday, March 29th. Institution, London. 9 p.m. "The Neutron and Radio-Active Transformations." Lord Rutherford.

Electrical Power Engineers' Association (*London Local Group*).—Monday, March 25th. Caxton Hall, S.W.1. 7.15 p.m. "High Voltage Cable Practice in the U.S.A." Mr. R. C. Mildner.

Rugby Engineering Society.—Wednesday, March 27th. B.T.H. Research Laboratory, Rugby. Paper by Mr. H. Trencham.

Institution of Electrical Engineers.—Thursday, March 28th. Institution, London. 6 p.m. "The Stability Characteristics of Alternators and of Large Interconnected Systems." Mr. W. D. Horsley. (*London Students' Section*).—Friday, March 22nd. Institution, London. 7 p.m. "Power Plant for Automatic Telephone Exchanges." Mr. K. B. Baldwin. Saturday, March 23rd. 3 p.m. Visit to the Research Laboratory of the General Electric Co., Ltd., Wembley. (*North-Eastern Centre*).—Monday, March 25th. Armstrong College, Newcastle-upon Tyne. 7 p.m. Paper by Mr. W. D. Horsley. (*North Midland Students' Section*).—Tuesday, March 26th. Hotel Metropole, Leeds. 7.15 p.m. Annual general meeting. (*North-Western Students' Section*).—Tuesday, March 26th. Engineers' Club, Manchester. 7.15 p.m. "Electrical Musical Instruments." Mr. D. H. Thomas. (*Scottish Centre*).—Tuesday, March 26th. Freemason's Hall, Edinburgh. 7 p.m. "Electrical Developments in the U.S.S.R." Mr. A. Monkhouse. Thursday, March 28th. Caledonian Hotel, Aberdeen. 7.30 p.m. Paper by Mr. A. Monkhouse. (*South Midland Students' Section*).—Tuesday, March 26th. James Watt Memorial Institute, Birmingham. 7 p.m. "Short Papers" meeting. (*Wireless Section*).—Tuesday, March 26th. Institution, London. 6 p.m. Informal meeting. Discussion on "The Servicing of Broadcast Receivers." To be opened by Mr. A. Hall. (*West Wales (Swansea) Sub-Centre*).—Thursday, March 28th. Electricity Offices, Swansea. 6.30 p.m. "Electricity in Steelworks." Mr. J. D. Meecham. (*North-Eastern Students' Section*).—Friday, March 29th. Visit to the Newcastle automatic telephone exchange. (*Western Centre*).—Friday, March 29th. Merchant Venturers' Technical College, Bristol. 7 p.m. Joint meeting with the Western Branch of the Institution of Mechanical Engineers. "Some Factors in Maintenance Engineering." Mr. A. J. Bowron.

Electrical Industries Benevolent Association (*South Coast Section*).—Friday, March 29th. Grand Hotel, Brighton. 8.30 p.m. Dance.

Electrical Powers Engineers' Association (*Birmingham and District Section*).—Friday, March 29th. Edgbaston Assembly Rooms, Birmingham. 7 for 7.30 p.m. Annual dinner-dance. (*London Western Section*).—Saturday, March 30th. St. Ermine's Hotel, S.W.1. 6.30 for 7 p.m. Annual dinner.

Notes

The Benevolent Association

It is hoped that there will be a large attendance of electrical men and women at the Savoy Hotel on April 12th at the luncheon following the annual meeting of the Electrical Industries Benevolent Association. The meeting takes place at 12 noon and the luncheon at 1 p.m. Sir Felix Pole, who has been nominated as president, will be in the chair, and the proceedings will not be unduly prolonged, so busy folk will be able to get back to their offices in the early afternoon. The tickets are 10s. each, inclusive of gratuities, and they are obtainable from the Secretary, Captain J. T. Keeping, 9, Southampton Street, Holborn, W.C.1, or from any member of the Executive Committee.

Conference on Industrial Physics

A conference on this subject which has been organised by the Institute of Physics is being held from March 28th to 30th under the presidency of Prof. W. L. Bragg in the laboratories of Manchester University. The subject being considered is vacuum devices in research and industry. Besides an exhibition in the University of instruments, apparatus and books cognate to the subject of the conference, a section is being devoted to popular applications of vacuum devices calculated to demonstrate their wide and varied application to everyday matters. The subjects of lectures and discussions are: "Modern Electrical Illuminating Devices," "Applications of Photoelectric Cells," "The Cathode-ray Oscillograph in Research and Industry," "Recent Applications of Mercury Vapour Rectifiers and Thyratrons," "High-tension Vacuum Tube Devices in Research and Industry," and "X-ray in Industry." Visits to local works and research laboratories are being arranged, and a dinner will be held in the College of Technology.

E.A.W. Luncheon

The first of a series of luncheons which the London Branch of the Electrical Association for Women is arranging for business people is to take place at the Criterion Restaurant, Piccadilly, London, W., on March 28th. These luncheons are to be reasonably brief, and at each a speaker will deliver a topical talk, the proceedings ending at about 2.30 p.m. Tickets, 4s. each, are obtainable from the E.A.W. headquarters, 20, Regent Street, S.W.1.

Tyne Electrical Engineers' Dance

The annual prize distribution and regimental dance of the Tyne Electrical Engineers, R.E., was held at the Empress Ballroom, Whitley Bay, on March 13th. Major-General R. H. D. Tompson, C.M.G., presented cups and prizes. He was welcomed by the commanding officer, Major R. P. Winter, M.C., and Col. E. Robinson, the hon. colonel of the Tyne E.E., also spoke. Dancing continued until 1 a.m. and the evening was much enjoyed by the 1,400 guests.

Immersion Heaters for Fire Engines

It is proposed to fit electric immersion heaters, with thermostatic control, in the radiators of all the fire appliances owned by the London County Council in order to maintain the temperature of the water at 100 deg. F. Experiments with an engine so equipped have proved entirely satisfactory from the point of view of quick starting. Hitherto, it has been necessary to run the engines for short periods at intervals during the day and night, but samples of air taken by the medical officer of health in certain stations showed that carbon monoxide diffused into the officers' sleeping quarters to an undesirable extent. The economy resulting from the discontinuance of this practice will more than cover the cost of the electricity required for the immersion heaters. Altogether 110 heaters are needed, and these will cost about £1,235.

The Long-lived Electrical Machinery

Messrs. Crompton Parkinson, Ltd., have got together some particulars relating to electrical machines of remarkable longevity. One built by Cromptons in 1881 was still at work in 1931, when it was taken away to the Faraday Centenary Exhibition. The only maintenance charges during its life were incurred for renewing the brass bushes, although it ran under a leaky roof and was cleaned only once a year. Another, a 60-kW 83⅓-cycle alternator driven by a water wheel was born in 1896 and is still at work in Darjeeling, India. For continuous running, the record put up by a 50-h.p. 755-r.p.m. Parkinson motor would be hard to beat; for twelve years it has run without a stop (except for two or three short pauses caused by fuse blow-outs), during which time it has made some 4,500 million revolutions. Recently an order was received for rewinding the armature of a bi-polar machine dating from 1903. A short-wound dynamo, built in 1888 for lighting a castle and outbuildings in Ireland, has recently been changed for an over-compensated machine for better voltage regulation. It was driven by a water-turbine which was shut down at night by the simple if drastic expedient of fusing a short length of steel piano wire from which the sluice gate was suspended.

Standard Photo-cell Specification

By defining the properties specified, the British Standard Specification just issued for photo-electric cells of the emission type (No. 586-1935), any misunderstandings of the terms used should be avoided. No attempt has been made to define the vague properties, but this omission may be rectified in later issues. In fixing dimensions four alternatives are offered to allow designers some latitude. One working voltage is prescribed as the standard, but others will be permitted so long as their departure from the standard is clearly indicated. The limits assigned to the properties of the cells are admittedly wide. This Specification applies to cells for sound-film apparatus only. Copies are obtainable from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d., post free.

Measurement of Glare

Means of approach to the problem of glare from motor-car headlights is provided by a report issued by the Department of Scientific and Industrial Research (Illumination Research Technical Paper No. 16, "The Evaluation of Glare from Motor-car Headlights," H.M. Stationery Office, price 1s. 6d. net).

Appointments Vacant

Showroom salesman for Lichfield Electricity Department.

Costing clerk for King's Lynn Electricity Department.

Clerk of the works in connection with rural electrification for Chichester City Council.

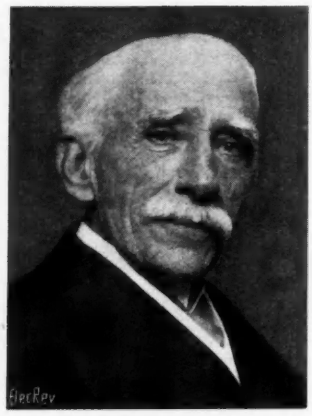
Scientific Officer for the Air Ministry Scientific Research Pool.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Sir J. Ambrose Fleming, M.A., D.Sc., F.R.S., has been awarded the Kelvin Medal for 1935 by the Kelvin Medal Award Committee of the Institution of Civil Engineers in recognition of his services to electrical science, and particularly of his invention of the thermionic valve. The presentation ceremony is expected to take place in the Great Hall of the Institution of Civil Engineers early in May. The Kelvin Gold Medal is awarded triennially as a mark of distinction in engineering work or investigations of the kinds with which Lord Kelvin was especially identified.



[*Elliott & Fry.*

Sir J. Ambrose Fleming

Mr. C. Faragher, divisional engineer in the office of the chief engineer of the Australian Postmaster-General's Department, is paying a visit to England, the Continent, and the United States. He will investigate the latest telephone engineering practice in the countries he visits. He is accompanied by Mrs. Faragher.

Dr. J. Blewett, M.B., B.S., M.D., Manchester, has been appointed radiologist in charge of the X-ray, massage, and electro-therapeutic departments at Aberdeen Infirmary.

Sir Felix Pole, chairman of Associated Electrical Industries, Ltd., has been nominated as president of the Electrical Industries Benevolent Association, and will take the chair at the luncheon which will be held at the Savoy Hotel on April 12th.

[*Lafayette*

Sir Felix Pole

Mr. F. W. Phillips, Director of Telecommunications, has been appointed a member of the Post Office Board by the Postmaster-General.

Mr. J. Lawson, traffic superintendent to the Rotherham Corporation, has been appointed chief assistant to the general manager of the Hull Corporation Transport Department.

Mr. L. G. H. Turner, traction power superintendent of the G.I.P. Railway, Bombay, will arrive in England on April 5th. Correspondence may be addressed to him c/o Messrs. Grindlay & Co., 54, Parliament Street, S.W.1.

Sir Arnold B. Gridley and **Mr. Norman J. Hulbert,** L.C.C., have been adopted as Conservative candidates for the Stockport Division at the next General Election.

The ELECTRICAL REVIEW wishes to congratulate **Sir Tom and Lady Callender** upon the fiftieth anniversary of their wedding, and in doing so we are expressing the felicitations of a very large number of electrical men and women. The event was celebrated on Tuesday last at a thanksgiving service held at St. Clement Danes Church in the Strand, and afterwards at the Savoy Hotel. The guests, who numbered 300, included Lady Cunliffe, Sir Andrew Duncan, Sir J. Fortescue Flannery, Sir Bernard and Lady Greenwell, Sir Philip and Lady Nash, Sir Arthur and Lady Preece, Sir Archibald and Lady Page, Sir Montague and Lady Hughman, Mr. and Mrs. George Balfour, Mr. and Mrs. T. O. Callender, the Misses Callender, Mr. H. Foulds, Mr. and Mrs. J. Snow Huddleston, Mr. and Mrs. Lackie, Mr. and Mrs. C. D. Taite, Mr. and Mrs. W. B. Woodhouse, and many others.

[*Lenare*

Sir Tom and Lady Callender

Sir Francis Joseph, C.B.E., has been nominated to succeed Lord Herbert Scott as president of the Federation of British Industries for the coming year. Sir Francis is chairman of several colliery companies and a director of the L.M. and S. Railway and the Stafford Coal & Iron Co., Ltd. His public services include membership of the Overseas Trade Development Council.

A *Reuter* message from Chicago states that the State Attorney has announced that the remaining charges of embezzlement against **Mr. Samuel Insull** and his brother, **Mr. Martin Insull,** are to be dropped.

Viscount Falmouth, who, as reported on another page of this issue, has been elected president of the British Electrical Development Association, is well known to the electrical industry by reason of his position as vice-chairman of the London and Home Counties J.E.A. Our readers will also remember that he was responsible for the introduction of an Electricity Supply Bill into the House of Lords last year which was designed to regulate the relationships between undertakings

The Executive Committee of the National Electrical Convention

Standing (left to right): Messrs. P. J. Robinson, R. S. Downe, C. D. Taite A. F. Harrison, J. W. J. Townley, J. Snow Huddleston, V. W. Dale, L. Romero, H. J. Randall, B. Handley C. W. Sully, V. Watlington, W. J. Bache, H. Marryat, C. G. Morley New, W. H. Thickett, A. C. Cramb and A. B. Wildsmith. Seated (left to right): Messrs. D. N. Dunlop, E. Seddon, J. W. Simpson (general secretary), E. E. Hoadley (president), J. C. Dalton, S. S. Grant and C. H. Cox.

and consumers, and sought to give electricity suppliers considerably increased powers of inspection, &c.

Mr. A. N. Dawkins, consumers' engineer to the Adelaide Electric Supply Co., Ltd., will arrive in England on April 5th to study propaganda and electrical development matters.

[*Howard Coster*

Mr. E. Rawdon Smith

Mr. E. Rawdon Smith has been appointed to the position of Public Relations Officer to the London Passenger Transport Board. The Public Relations Department is a new one, charged with responsibility for the whole of the relations between the public and the Board. The duties include relations between the Press, public authorities and associations and the Board, the control of all correspondence from the public, arrangements in connection with visits paid to the Board's undertakings, and the preparation and supply of official information with regard to the Board and its activities. Mr. Rawdon Smith was, until his present appointment, assistant secretary. **Mr. H. S. Chapman** has been appointed assistant secretary in his place.

Mr. S. B. Jackson, of the Central Electricity Board, has been elected a member of the Council of the Institute of Marine Engineers in place of Mr. A. Cross, vice-chairman, who has resigned. With **Mr. A. E. Laslett,** I.S.O., he has been appointed to represent the Institute on the I.E.E. Ship Electrical Equipment Committee.

Mr. E. J. Doyle has resigned his position with the Kniveton Cable Works, Ltd., to take up an appointment on the sales staff of Carron Company, as representative in the Southern area.

Mr. Winston Robinson, of Hull, has been appointed manager of the Brighton Transport Department at a salary of £650 per annum.

Mr. W. M. Read, assistant mains engineer to the Eastbourne Corporation Electricity Department, has been appointed district mains engineer to the Southampton Corporation Electricity department. Mr. Read was educated at Exeter School and King Edward VII School, Sheffield, and at the Southampton University College. He entered the works of Pirelli-General Cable Works, Ltd., in 1924, and was appointed wayleaves officer at Eastbourne in October, 1930, being promoted to assistant mains engineer in December, 1933, in which position he was responsible for all the work of the Eastbourne rural area electrification.

Mr. H. Haigh, electrical engineer and manager to the Shipley Urban District Council, has been appointed borough electrical engineer at Middlesbrough at a salary of £750 per annum, rising to £1,000. Mr. Haigh received his education at Belle Vue Secondary School, Bradford, and served his articles with the borough electrical engineer of Morecambe, where he acted as mains engineer for seven years. For five years he was engineer and manager of the Gainsborough electricity undertaking, and in 1931 he was appointed to his Shipley position.

[*Savoy Studios*

Mr. H. Haigh

Mr. S. J. Birtles has been appointed Midlands representative for Messrs. Kent Bros.' Electric Wire Co. and E. H. Phillips, Ltd., taking over the position which was occupied for many years by his brother, the late Mr. J. H. Birtles.

Dr. W. Ewart Williams has been awarded the twelfth Duddell Medal by the Council of the Physical Society. Dr. Williams is distinguished for his work in optical design, chiefly in the region of interferometry.

Obituary

Mr. A. Walters.—The death occurred on March 13th, in his eightieth year, of Mr. Austin Walters, founder of Messrs. Austin Walters & Son, Ltd., of Manchester.

Dr. M. I. Pupin.—The death is announced in New York, at the age of seventy-six, of Dr. Michael Idvorsky Pupin, whose inventions helped to make wireless telegraphy and long-distance cable communication commercially practicable.

Mr. R. Bate.—The death occurred on March 8th, in his thirty-third year, of Mr. Richard Bate, for many years with Messrs. Durant & Willitts, Ltd., electrical wholesalers, of Birmingham.

Wills.—Sir William Slingo, formerly engineer-in-chief of the General Post Office, and a director of the Marconi International Marine Communication Co., left £14,426 (net personalty £12,733).

Mr. J. H. Whitley, chairman of the B.B.C., left £44,660, with net personalty £38,287.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Sinterae, Ltd.—Private company. Registered March 11th. Capital, £1,000 in 1,200 ordinary and 2,800 7 per cent. cumulative participating preference shares of 5s. each. Objects: To carry on the business of manufacturers of and wholesale and retail dealers in electric, gas and oil lamps, illuminating engineers and contractors, &c. The subscribers are: H. Cole, "Gathorne," Rayners Lane, Pinner, Mddx.; and A. J. Sturgeon, 5, Gosberton Road, Balham, S.W.12. Secretary: F. R. Hopkins. Registered office: Avenue Chambers, Vernon Place, Southampton Row, W.C.1.

Express Electrical (Hampton), Ltd.—Private company. Registered March 11th. Capital, £500 in £1 shares. Objects: To acquire the business carried on at 12, Percy Street, London, as Express Electrical Supplies Co., and to carry on the business of wholesale and retail dealers in electrical radio and mechanical goods, &c. The first directors are: A. S. W. Hadley, electrical engineer, and Mrs. V. E. Hadley, both of 5, New Broadway, Hampton Road, Hampton Hill, Middlesex. Secretary: G. Byfield, 49, Kenton Gardens, Kenton, Middlesex.

Dowsing Medical Institute, Ltd.—Private company. Registered March 13th. Capital, £1,400 in £1 shares. Objects: To establish, acquire or develop establishments for electrical or other curative treatment, &c. The subscribers are: F. W. J. Cripps, 3, St. Mary's Avenue, Shortlands, Kent; and M. H. Johnston, 32, Gledstones Road, W.14. Solicitors: E. G. Scott, 33/4, Broad Street Avenue, E.C.2.

W. Lyon Stubbs & Co., Ltd.—Private company. Registered March 11th. Capital, £750 in £1 shares. Objects: To acquire the business of an electrical and general agent carried on by Wm. L. Stubbs at Imperial Buildings and or Booth Street East, Manchester, 13. The directors are: W. Lyon Stubbs, 5, Albemarle Avenue, Withington, Manchester, and two others. Registered office: Langite Corner, Booth Street East, Manchester, 13.

James Haley & Co., Ltd.—Private company. Registered March 12th. Capital, £500 in £1 shares. Objects: To acquire the business of an electrician and electrical contractor heretofore carried on by Ann Haley at 40, Hopwood Lane, Halifax. The directors are: T. E. Haley and H. S. Haley, both of 40, Hopwood Lane, Halifax. Solicitors: A. J. C. Hirst, Bull Green House, Halifax.

Pemberton & Sturgess (Great Britain), Ltd.—Private company. Registered March 14th. Capital, £1,000 in 2s. shares. Objects: To carry on the business of electricians, mechanical and scientific engineers, &c. The directors are: S. N. Pemberton, 93, Village Way, Pinner, and two others. Registered office: 40/42, Queen Victoria Street, E.C.4.

Jewish Radio, Ltd.—Public company. Registered March 15th. Nominal capital £1,000 in 1s. shares. Objects: To construct and maintain wireless signal stations and all other stations for the reception or distribution of radio signals or waves, &c. The directors are: H. E. Fenchelle, 89, Elgin Avenue, Maida Vale, W., and A. S. Cox, 7, Hornsey Lane Gardens, N.6.

Returns of Electrical Companies

South Beds Electrical Finance, Ltd.—The nominal capital has been increased by the addition of £5,000 beyond the registered capital of £3,000. The additional capital is divided into 5,000 5½ per cent. redeemable preference shares of £1 each.

Watkins & Smith, Ltd.—Charge on 257 and 259, Chatsworth Road, Chesterfield, dated March 1st, 1935, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

Block Batteries, Ltd.—Issue on February 21st, 1935, of £1,000 debentures, part of a series already registered.

Turnadge & Partners, Ltd.—G. J. Hakin, of 10-13, Newgate Street, E.C. ceased to act as receiver and manager on March 7th, 1935.

Corona Lampworks (Southern), Ltd.—Debenture, dated February 20th, 1935, to secure £6,200, charged on the company's undertaking and property, including uncalled capital. Holder: W. W. B. Jackson, receiver of Corona Lampworks, Ltd. (in liquidation), 65/6, Chancery Lane, W.C.2.

Electric Fires, Ltd.—Satisfaction to the extent of £6,000 on February 26th, 1935, of mortgage dated April 8th, 1926, and registered April 23rd, 1926.

Curtis Manufacturing Co., Ltd.—Capital, £6,000 in £1 shares. Return dated September 7th (filed December 5th), 1934. All shares taken up. £1,000 paid. £5,000 considered as paid. Mortgages and charges, nil.

Tungsram Electric Lamp Works (Great Britain), Ltd.—Capital, £100 in £1 shares. Return dated December 11th, 1934. Ten shares taken up. £10 paid. Mortgages and charges nil.

Park Bros., Ltd.—Capital, £6,000 in 3,000 preference and 3,000 ordinary shares of £1 each. Return dated July 23rd, 1934 (filed March 9th, 1935). 2,940 preference and 2,581 ordinary shares taken up. £5,471 paid. £50 calls unpaid. Mortgages and charges, £650.

Wirral Electric, Ltd.—Issue on February 27th, 1935, of £60 debentures, part of a series already registered.

Thorn & Hoddle, Ltd.—Satisfaction in full on February 1st, 1935, of debenture dated January 20th, 1915, and registered January 23rd, 1915, securing £1,000.

Simplex Electric Co., Ltd.—Capital, £500 in £1 shares. Return dated November 6th, 1934. All shares taken up. £500 paid. Mortgages and charges nil.

Eons Electrical Co., Ltd.—W. H. Brown, of 19a, Coleman Street, E.C.2, ceased to act as receiver on March 1st, 1935.

Tubes, Ltd.—Capital, £215,000 in £1 shares. Return dated November 8th, 1934. All shares taken up. £107,584 paid (£1 per share on 82,859 and 10s. per share on 82,691 shares), £24,725 considered as paid (10s. per share on 49,450 shares). Mortgages and charges nil.

City Notes

The County of London Electric Supply Co., Ltd., held its annual meeting on March 19th, Sir Bernard Greenwell (chairman) presiding. In presenting the report and accounts (ELEC. REV., March 15th, p. 400), the chairman said the sales of electricity had increased from 693,000,000 to 1,050,000,000 in a year; their own increased business accounted for nearly 20 per cent. of this extra output, the remainder being sold to the Central Electricity Board. The enlarged Barking station was in commercial operation for the year with excellent results and they had been asked by the Central Board to increase the capacity of the station by another 75,000 kW, making in all 465,000 kW. During the year they had made reductions in charges to consumers totalling over £162,000. The expenditure during the year was over £1,100,000, mostly accounted for by mains. The thermal efficiencies which they had obtained with the new plant had exceeded the contract guarantee figures, and the efficiency of the new extension was 20 per cent. greater than that of the older plant. The average cost of coal per kWh sent out in 1929 was 0.114d., whereas for 1934 the cost of coal for the whole station was 0.098d. per kWh, although the price of coal was over 8 per cent. greater. It had become necessary to lay various 33,000-V cables not only in their own system but to those of their bulk supply customers, and they had substantially increased the carrying capacity of their mains. This reinforcement had consisted in providing additional 11,000-V feeder cables, new transformer stations and l.p. mains, and in addition, they had modernised existing sub-station equipment and had extended the network where practicable. This work had involved the laying of sixty miles of h.p. transmission, about 400 miles of medium and l.p. mains, and the establishment of 108 new sub-stations. Application had been made to the Electricity Commissioners for sanction to the laying of new 66,000-V cables from Barking station into the Wandsworth area. This would entail an expenditure of nearly £1,000,000, and the work would be carried out in sections and the cost spread over a few years. During the past year they found themselves in conflict with the Central Board, and they opposed a Bill which was being promoted on behalf of the Board giving it powers to supply railways direct. Nevertheless their relationships with the Central Board had throughout been of a cordial nature. During the past year Parliament gave them statutory powers with regard to Saffron Walden, Chelmsford and district, and Caterham and Woldingham, and they had increased the sales of electricity in all of these districts. With regard to public lighting they and their two associated London companies, the South Metropolitan and the South London Companies, had just completed contracts with the Lewisham and Greenwich Borough Councils and various urban authorities for the lighting of 130 miles of streets, and they had, within the last month, entered into a contract with the Coulsdon and Purley U.D.C. for seventy miles of street lighting. With regard to the current year, the position to date was that they had had an increase of 45 per cent. above the sales for the same period last year, and of that increase the extra kWh sold to their own consumers represented over 11 per cent., the remainder going to the Central Board. The chairman then detailed the reductions made in charges in the various areas, and said that 68 per cent. of their ordinary consumers were being supplied on the two-part tariffs. Their associated companies were keeping pace with the parent company. The report and accounts were adopted and resolutions were passed authorising an increase in the share capital from £12,000,000 to £14,000,000, and the conversion of the existing shares into stock.

The North-Eastern Electric Supply Co., Ltd., held its annual meeting at Newcastle-upon-Tyne on March 19th, Mr. R. P. Sloan (chairman) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, March 15th, page 400), the chairman said the new connections made to the system (55,916 h.p.) had exceeded their previous record, and brought their total connections up to 923,393 h.p. The actual number of new consumers connected last year was 19,340, which was a little below the 1933 figure. They had continued to find a ready demand for their supplies in country districts and a considerable proportion of the new connections were obtained in these rural areas, where, during recent years, they had been carrying out extensive developments. The length of their cables and lines established for the purpose of affording supplies in rural areas amounted at December 31st last to more than 750 miles, and they then had nearly 600 farms and farming premises connected to their system. The revival in industry was indicated by the increased connections made by power users during the year. They had made certain reductions in the charges to the smaller class of industrial consumer, which took effect as from the commencement of the current quarter. The directors had also decided to reduce the charges for supplies to lighting and domestic consumers, as from the commencement of the coming quarter. These reductions together would represent concessions of the order of £80,000 for a full year and £62,000 for the portion of the current year during which they would take effect. While the concessions were substantial, it was expected that further business would be obtained as a result. The activity among their colliery consumers had also been considerable and during 1934 privately-owned generating plants on colliery premises aggregating approximately 17,700 h.p. were closed down permanently, and their place taken by supplies from the company's mains. In addition, negotiations were completed during the year which would result in the closing down of other private generating plants at collieries having an aggregate capacity of nearly 30,000 h.p. The iron and steel industries, to which they afforded extensive supplies, were better placed than they had been for several years, and there was reason to believe that they would show further improvement during the course of the current year. The orders for additional supplies which they had on hand at the beginning of the year represented over 41,000 h.p. The corresponding figure in January, 1934, was 18,000 h.p. The number of new consumers connected since the beginning of the year continued to be encouraging. Regarding the standardisation of the frequency of their system a further 217,600 h.p. of consumers' motors had been changed over from 40 to 50 cycles during the year.

The Lancashire Electric Light & Power Co., Ltd., reports that the trading profit of the subsidiary companies (the Lancashire Electric Power Co. and the Ormskirk Electric Supply Co., Ltd.) for 1934, plus interest receivable, was £346,400, as compared with £346,357 in the preceding year, which with balances brought in makes £353,713. Of this, £20,000 has been appropriated for income tax, £90,500 for depreciation, £4,476 is carried forward, and a balance of £238,667 is paid over to the Electric Light & Power Co. The company's net balance is £192,614, as compared with £187,397, and with £8,978 brought in there is £201,592 available. The ordinary dividend for the year is maintained at 7½ per cent., and £8,491 is carried forward. The report states that during the year considerable extensions were made to the mains and distributors of the operating companies to deal with increasing business, and the undertaking of the West Lancashire Rural District Council was acquired, and is now being operated as part of the company's area. The scheme of the Central Electricity Board for N.W. England and N. Wales came into operation on January 1st, 1934, and the generating stations of the Parliamentary company have been operating thereunder during the year. The Central Electricity Board has instructed the company to proceed with the extension of Kearsley generating station by the addition of a 51,600-kW turbo-alternator with boilers and auxiliary plant. The Lancashire Electric Power Co. generated or purchased 405,194,341 kWh in 1934, as against 326,333,445 kWh in 1933, the maximum load increasing from 142,500 to 170,500 h.p., and the connections from 179,000 to 187,500 h.p. Receipts were £784,572 (against £736,100), and the profit on trading £344,675 (against £343,900). Meeting: March 26th.

The Isle of Thanet Electric Supply Co., Ltd., held its annual meeting on March 14th, when Mr. A. R. Hoare (chairman), said that the increasing demand for electricity, particularly in the Margate area, had necessitated the erection of a new sub-station in that borough and further plant in one of their existing sub-stations, as well as additional cables and house-services. They had connected up 837 new consumers raising the total to 9,823. Profit on the sale of electrical apparatus was a new item in their revenue account. They decided a few months ago to extend easy terms of payment for such apparatus, and they believed there would be an increasing demand for the various domestic labour-saving appliances. A substantial number of their Margate consumers had taken advantage of their two-part tariffs, 38 per cent. of the electricity sold in that area during 1934 coming under the new scale. The average revenue from these two-part tariff consumers was only slightly in excess of 2½d. per kWh. The granting of an extension of their tenure would not only facilitate the further reduction of charges, but would materially assist them towards the greater development of the undertaking. Although the sales of energy during 1934 had increased by 689,632 kWh, they had been able to economise to the extent of £1,681 on their generating and sub-station costs.

City of London Electric Lighting Co., Ltd.—Presiding at the annual meeting on Wednesday last Mr. P. D. Tuckett (chairman), in the course of his speech, said that as from January 1st last year the company's Bankside station had been operating under the instructions of the Central Electricity Board. From an accountancy standpoint, this had resulted in a considerable charge, and they had been unable to give full effect to it in the statement of accounts before the meeting. Regarding the new standard prices, except on one point which awaited arbitration, the basic figures had been agreed with the Electricity Commissioners. Last April they made drastic reductions in their charges in the hope of their being enabled to earn a small share of the "consumers' benefit," but if they had foreseen the exceptional weather experienced last year it was doubtful whether they would have been as generous in their price reductions, for their money value to the consumers had been about £77,000 over the nine months, and would be about £115,000 in a full year. In the last ten years the average price for electricity to consumers had fallen from 3.1457d. to 1.7253d. per kWh, and during the same period the output had increased from 72,789,119 to 126,332,900 kWh.

The Telephone & General Trust, Ltd., held its annual meeting on March 14th when Sir Alexander Roger (chairman), who presided, said they had continued to cultivate the relationships which they had built up over the past nine years in different branches of the communications industry. The short-term borrowing and lending policy which they pursued had been of mutual benefit and convenience to the telephone operating companies with which they were associated and to themselves. They had established relations between the telephone administration of Poland and their organisation through contracts and the furnishing of finance, and recently a similar arrangement was made with Lithuania. In both cases they had had the support of the Export Credits Guarantee Department. Referring to world trade, the chairman said that in the foreign field several trade agreements had been concluded, all of which tended towards the breaking down of barriers and opening up of new avenues for trade. Regarding the future of their business, he thought that in the main expansion was likely to go on, and they might, therefore, reasonably expect that 1935 would enable them to submit accounts no less favourable than those now presented.

The London Passenger Transport Board.—The scheme for the pooling of all suburban railway passenger receipts with those of the London Passenger Transport Board, and their allocation among the various parties came before the London Passenger Transport Tribunal on March 18th. According to the *Times*, under the scheme the proportions in which the parties are to participate in the pooled receipts are as follows:—The Board, 62.879 per cent.; G.W.R., 1.11332 per cent.; L.M.S., 4.74747 per cent.; L.N.E.R., 5.80557 per cent.; Southern Railway, 25.45464 per cent. (total railway companies, 37.121 per cent.). The scheme is deemed to have come into operation on July 1st, 1933, and to take effect from that date. Provision is made in certain circumstances for any party to the scheme to apply for a revision of the standard proportions. It was stated that the receipts on suburban services by the L.P.T.B. and the four railway companies for 1932 were £38,357,878, and, after deduction of the agreed operation allowances, there would have been available for the pool £16,234,788. Further considera tion of the scheme was adjourned till April 9th.

The Midland Electric Corporation for Power Distribution, Ltd., reports a net profit for 1934 of £95,668, as compared with £86,929 for 1933, which with £9,472 brought in makes £105,140. It is proposed to pay a final ordinary dividend of 5 per cent., maintaining the distribution for the year at 8 per cent., and to carry forward £34,509. The report states that the year was one of record progress, 5,521 new consumers and 10,689 kW of demand being connected. The sales of electricity increased by 30 per cent. To meet this growth £167,776 was expended on extensions to the distribution system. The whole of the free reserves (£200,000) existing at the date of the 1933 Special Order have now been invested in the undertaking, while the total reserves so invested amount to £233,333. It is proposed to capitalise this sum and resolutions for the increase of capital and distribution of bonus shares in the proportion of one for every three ordinary shares held will be submitted at the meeting on March 26th. A reduction of 20 per cent. on all charges in the standard tariff contained in the 1933 Special Order has been in operation throughout the year.

British Insulated Cables, Ltd., reports a profit for the year ended December 31st last of £558,760, as compared with £517,455 in the preceding year. To this is added £300,724 brought in, making £859,484. Of this, £100,000 is appropriated for depreciation on buildings, plant, machinery, &c., and £100,000 is placed to reserve. It is proposed to pay a final ordinary dividend of 10 per cent., making 15 per cent. for the year, and to carry forward £301,387. The report states that the volume of trade and resultant profits are in excess of those of previous years. Meeting: March 26th.

Pinchin, Johnson & Co., Ltd., report a profit for 1934 of £320,333, as against £254,206 in the preceding year. The final ordinary dividend is 10 per cent., making 17½ per cent. for the year (against 15 per cent.), and £68,143 is carried forward. It is proposed to increase the capital to £2,800,000 by the creation of 300,000 4 per cent. £1 second cumulative preference shares. Subscribers for these shares will be entitled to subscribe for one new ordinary share of the denomination of 10s. at 28s. for every four new preference shares taken. Meeting: March 27th.

Brown Bros., Ltd.—Presiding at the annual meeting held on March 15th, Mr. J. A. Thomson (chairman and managing director), in the course of his speech said that the results for the year in their radio department were not unsatisfactory, and on the whole he thought that the radio trade to-day was in better hands and in a healthier state than at any previous time.

The Newcastle & District Electric Lighting Co., Ltd., reports a gross profit for 1934 of £75,724, as compared with £70,510 in the preceding year, to which is added £15,732 brought in, making £91,456. After deducting debenture interest, &c., it is proposed to maintain the dividend for the year at 7 per cent., and to carry forward £15,739.

The British Thomson-Houston Co., Ltd., reports a profit for 1934 of £356,433, after providing for debenture interest and tax, as compared with £256,948 in the preceding year. It is proposed to pay an ordinary dividend of 3 per cent. for the year and to carry forward £250,813. No ordinary dividend was paid in 1933, but a distribution of 4 per cent. was made in respect of 1932.

British Insulated Cables, Ltd.—Preliminary figures issued by the company show that the profit for 1934 was £558,760, as against £517,454 for 1933. It is proposed to pay a final ordinary dividend of 10 per cent., maintaining the distribution for the year at 15 per cent., and to place £200,000 to reserve and depreciation. The amount carried forward is £301,000.

The Salisbury Electric Light & Supply Co., Ltd., reports a balance of £16,414 on the year's working, after paying debenture interest, and providing for income tax and depreciation, and including the amount brought in. It is proposed to pay a final dividend of 6 per cent., making 10 per cent. for the year, to put £3,500 to reserve, and to carry forward £414.

The Windermere & District Electricity Supply Co., Ltd., reports a net profit for 1934 of £15,324, including £3,450 brought in. The ordinary dividend for the year is 10 per cent., and £4,454 is carried forward.

The Keswick Electric Light Co., Ltd., reports a balance of net revenue, including the amount brought in, of £4,452. The final ordinary dividend is 6 per cent., making 10 per cent. for the year, and £762 is carried forward.

Crossley Bros., Ltd.—At meetings of the holders of the 7 per cent. cumulative preference and ordinary shares held in Manchester on March 19th the scheme of capital reorganisation was approved.

Companies Struck Off the Register.—The names of the following companies have been struck off the Register and they are thereby dissolved:—Electrical Contracting Co. (Tamworth), Ltd.; Electric Haulage Co., Ltd.; St. Andrew Electric & Radio Co., Ltd.

The Shanghai Electric Construction Co., Ltd., has declared a final dividend of 9 per cent., making 13 per cent. for the year (against 11 per cent. for 1933). A 10 per cent. share bonus was distributed in March last year.

Associated Electrical Industries, Ltd., proposes to pay a dividend of 6 per cent. on the ordinary stock for 1934, to place £10,289 to reserve, making that fund £900,000, and to carry forward £113,336. For 1933 the ordinary dividend was 3 per cent.

The Elektrolux Co. (Sweden) reports a profit of Kr. 7,901,828 for 1934, as against Kr. 7,202,541 for 1933. It is proposed to pay a final dividend of 5 per cent., making 9 per cent. for the year (against 8 per cent.), and to carry forward Kr. 5,506,838.

The International Automatic Telephone Co., Ltd., has declared a final ordinary dividend of 5 per cent., less tax, making 8 per cent. for 1934 (unchanged).

The Rangoon Electric Tramway & Supply Co., Ltd., proposes to pay a final ordinary dividend of 14 annas per share, free of Indian tax, making 20 annas per share for the year (same).

The Oxford Electric Co. has announced a dividend of 7 per cent. on the ordinary shares for 1934 (unchanged).

General Refractories, Ltd., has declared a final dividend of 7½ per cent., making 12½ per cent. for the year (against 10 per cent. for 1933).

The Mersey Power Co. reports a profit of £113,224 for 1934, against £97,153 for 1933. The ordinary dividend for the year is 6 per cent. (against 4½ per cent.), and £5,258 is carried forward.

Waste Heat & Gas Electrical Generating Stations, Ltd., have announced a final dividend of 5½ per cent., making 8 per cent. for the year (unchanged).

The City Electric Light Co., Ltd. (Brisbane) is paying a final dividend of 2½ per cent., making 6½ per cent. for the year.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets can certainly not be accused of failing to provide matter of interest, not to say excitement, to people with money in stocks and shares. This week, the action of Germany in proclaiming conscription has given rise to fairly sharp fluctuations, and at the same time, to endless debates as to what is to be the outcome of this action. British Government stocks fell back, though not to the same extent, of course, as did the German National loans. Apprehension feared that Paris, or Brussels, or New York, might be tempted by the German proclamation into selling British stocks and shares. This actually took place to a small extent, though to nothing like the measure which many people rather expected. Taking Brazilian Traction shares as a representative example, the price, from 9½, to which it had risen on talk of a possible abandonment of the gold standard by Belgium, fell to 8¼, from which it recovered to 9½ upon news that the Belgian Cabinet had resigned. This was accepted as a certain sign that Belgium would go off gold. The purely gilt-edged markets have followed the lead set by British Government stocks, excepting those comprised in the list of Home electricity supply companies. In these, a fairly general improvement has taken place, small, it is true, but none the less welcome after the considerable falls that have occurred during the past month.

Electricity Supply Shares

The formation of the London Associated Electricity Undertakings seems to have had the effect of unsettling the minds of proprietors of shares affected by the proposals. At any rate, a good many shares came to market about a fortnight ago, when the details were first announced, and when subscriptions of 90 per cent. from the constituent companies were asked for in order that the plan might become operative. Later, it has been discovered that 60 per cent. will be sufficient to carry the scheme through, though a more substantial proportion will effect a relatively greater saving in expenses. Official notification has been made of the fact that assents have been received sufficient for the co-ordination of the original six London electricity supply companies to proceed with the plan. The new company has issued a statement setting out the reason for the formation of a unifying company instead of an actual amalgamation. The board's explanation had the effect of steadying the market for London electricity supply shares. Various rises of 6d. a share stand to the credit of the list, though here and there small declines have occurred. Midland

Electric Power has risen to 52s. 6d. as a result of the announcement of a share bonus mentioned here last week. Shares in the Scottish companies are steady, Clyde Valley at 42s., Scottish Power at 41s. 3d. London Electrics are a little easier, notwithstanding an increase in the company's dividend.

Occasion has been taken this week to set out the 1934 dividends paid by the principal electricity supply companies. It may be well to mention that in the case of the St. James' Company, the dividend of 8¼ per cent. consists of 7 per cent. dividend and 1¼ per cent. bonus. Whether the bonus will be continued, no one can tell. In calculating the yield, it is a little difficult to know whether to base this upon the dividend alone, or upon the dividend cum bonus. The latter course has been adopted, and this is the reason why the return on St. James' is noticeably higher than that upon the shares in the other London companies.

Manufacturing Companies

Electrical equipment companies' shares are, it will be observed by reference to the quotations, holding their prices very steadily. Associated Electrical Industries ordinary are to receive 6 per cent. dividend, being double that of last year, and the company is strengthening its appropriation accounts. The price of the shares is unchanged at 26s., the preference remaining at 37s. British Insulated are better at 3⅞: the company is again paying 15 per cent. dividend for the year. Telegraph Constructions, after their tolerably heavy fall to 20s., rallied to 22s. 6d. General Electrics are quoted at 48s. 3d. Monday in this week was the last date for lodging with the company allotment letters of ordinary shares or renunciation forms. Brush ordinary stock is 3 points down.

The British Thomson-Houston Company is about to pay a dividend of 3 per cent. on its ordinary shares for 1934, as against nil for the previous twelve months. The profits for 1934 were £99,500 higher than those for the previous year. The International Automatic Telephone Company has declared a dividend making 8 per cent. for 1934, a repetition of that previously paid. The ordinary shares are 6d. better at 38s.; the "B" deferred are 36s. 6d. Ericsson Telephones ordinary at 5½, are 2s. 6d. easier on the week. Telephone & General Trust ordinary declined to 31s. 3d. Enfield Rolling Mills show a few pence gain at 27s. 3d. Hall's Telephones are 6d. down at 21s. 6d.

American Utilities

American Telephone & Telegraph stock has fallen 4 points to 106 xd. American utility companies' shares continue to be affected by the conditions, set out here a week ago, under which the United States and the Canadian companies are made to appear the sport of politics, and compelled to adjust their charges in such manner as to leave the slenderest possible margin of working profit—if any at all. It is more particularly the common and preferred shares that have been affected by the campaign against the companies. The bonds have held up moderately well; in fact, the prices of various bonds in American Utility companies are now standing substantially higher than they did a year or two back.

The report of the American Telephone & Telegraph Company for 1934 shows the useful gain of 14 million dollars in the total net earnings of the Bell system. The net earnings of the American Telephone & Telegraph came, however, to a little under 146 million dollars, as compared with 162 million dollars in the previous year. The company has the astonishing number of 675,000 stockholders, of whom more than half are women. The aggressive attitude towards utility companies adopted by President Roosevelt is manifest in the appropriation of 750,000 dollars set aside to make a thorough investigation into the telephone and other communication companies. International Telephone & Telegraph shares have fallen to 6.

Gilt-edged Stocks

The only changes worth noticing in the list of gilt-edged stocks connected with electricity supply are a fall in Central Electricity fives of 1955-1975 and a rise of a point in London Passenger Transport "B" 5 per cent. stock, to 117 and 124½ respectively. London Passenger "C" holds its recent substantial rise at 98. Details are now available of the pooling scheme under which the suburban passenger traffic receipts of the four big railways and the London Passenger Transport Board are to be shared. In the dulness which overspread debenture stocks and preference shares those connected with the electrical industry have so far escaped.

Miscellaneous Matters

It is only natural that the stocks of the Cable and Wireless group should show declines, in the face of the present political and financial situation. The falls are limited to a point in the combine's preference, and 10s. in the 7½ per cent. "A" ordinary stock. Globe ordinary are ¼ higher, despite the general depression. Anglo-American Telegraph preferred shed a point. Beyond these negligible changes, nothing of interest has occurred.

The rubber share market is flat, in consequence of a fall in the price of the raw produce to, at one time, 5¼d. per lb. Iron and steel shares, notwithstanding the excellent results being reported by a number of the leading companies in this branch of industry, lean to the dull side by reason of the expectation that Belgium will "go off gold." Babcock and Wilcox shares are unchanged at 44s.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1933.	Dividend. 1934.	Price. Mar. 19.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	—	77/6	—	3 16 2
Brompton Ordinary	1	7	7	33/–	+6d.	4 4 10
Charing Cross Ordinary	1	7	7	33/–	+6d.	4 4 10
Chelsea	1	7	7	33/–	—	4 4 10
City of London	1	7½	7½	36/6	+6d.	4 2 2
Clyde Valley	1	7	7	42/–	—	3 16 2
County of London	1	10½	10½	55/–	—6d.	3 16 4
Edmundson's 7% Pref.	1	7	7	36/–	—	3 17 8
Elec. Dis. Yorkshire	1	9	9	46/–	– 1/–	3 18 3
Elec. Supply Corporation	1	11	—	57/6	—	3 16 5
Kensington Ordinary	1	7	7	33/6	+6d.	4 3 7
Lancs Light and Power	1	7	7½	36/6	—6d.	4 2 2
London Electric	1	7	8	38/–	—6d.	3 13 8
Metropolitan	1	10	10	50/–	+6d.	4 0 0
Midland Counties	1	7	7	35/6	—	3 19 0
Mid. Elec. Power	1	8	8	52/6	+ ¼	3 1 0
North Eastern Electric Ordinary	1	6	6	32/–	+6d.	3 15 0
Do. 7% Pref.	1	7	7	34/6	+6d.	4 1 2
Northampton	1	10	10	52/6	—	3 16 4
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	59/6	—1/3	3 7 1
Do. do. 6% Pref.	1	6	6	31/–	—	3 17 5
St. James and Pall Mall	1	7	8¼	33/6	+6d.	4 18 6
Scottish Power	1	8	8	41/3	—	3 17 8
South London	1	7	7	36/–	—	3 17 9
Westminster Ordinary	1	7	7	33/–	+6d.	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	26/3	—	5 14 1
Yorkshire Elec.	1	8	8	43/–	—	3 14 5

PUBLIC BOARDS

Central Electricity, 1950–70	Stock	5	5	115	—	4 7 2
Do. 1955–75	„	5	5	117	—1	4 5 6
Do. 1951–73	„	4½	4½	111	—	4 1 1
Do. 1963–93	„	—	3½	101	—	3 9 6
London & Home Counties, 1955–75	„	4½	4½	114	—	3 19 0
London Passenger Transport, A	„	—	4½	121½	—	3 14 0
Do. do. B	„	—	5	124½	+1	4 0 4
Do. do. C	„	3	—	98	—	3 1 3
West Midlands Joint Elec. 1948–68	„	—	5	116	—	4 6 2

TELEGRAPH AND TELEPHONE.

		1932	1933			
American Tel. & Tel.	$100	9	9	106xd.	—4	8 9 8
Anglo-Am. Tel. Pref.	Stock	6	6	119½	—1	5 0 5
Do. Def.	„	1½	1½	28	–	5 7 2
Cable & Wireless 5½% Pref.	„	2¾	2¾	84	—1	3 5 8
Do. A. 7½% Ord.	„	Nil	Nil	17½	—½	—
Do. B. Ord.	„	Nil	Nil	6½	—	—
Globe Tel. & Tel. Ord.	10	Nil	2½	11½	+½	2 3 7
Do. do. Pref.	10	6	6	13½	—	4 10 7
Great Northern Tel.	10	20	20	39½	—	5 1 2
Marconi-Marine	1	10	7½	34/6	+9d.	4 7 7
Oriental Telephone Ord.	1	12	12	3 ¼	—	*3 12 5

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	–	—
British Electric Traction Df. Ord.	„	5	5	885	—30	—
Do. do. Pref. Ord.	„	8	8	167½	—1	4 15 9
Brazil Traction	100	—	—	9½	+½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 17 6
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	40	—	—
Victoria Falls Ord.	1	15	20	7⅜	—	2 14 6
Yorkshire (West Riding)	1	2½	5	28/9	—	3 9 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	10	66/3	—	3 3 3
Assoc. Elec. Ord.	1	4	3	26/–	—	2 6 0
Do. Prf.	1	8	8	37/–	—	4 6 4
Babcock & Wilcox	1	9	6	44/–	—	2 14 7
British Aluminium Ord.	1	5	5	32/–	+9d.	3 2 6
British Insulated Ord.	1	5	15	77/6	+ ¼	3 17 5
Brush Ord.	Stock	Nil	Nil	37½	—3	—
Callender's	1	15	15	3½	—	4 5 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	22	12½	35/6	—	1 15 0
Do. 8% Pref.	1	8	8	36/3	+ ¼	4 8 5
Edison-Swan 1st Pref.	1	7½	7½	23/9	—	6 6 4
Electric Construction	1	Nil	Nil	15/–	—	—
Enfield Cable Ord.	1	25	20	4½	—	5 2 6
English Electric	1	Nil	Nil	6/9	—	—
Do. do. Pref.	1	Nil	Nil	12/6	—	—
Ever Ready	5/–	35	35	22/9	—9d.	7 13 10
Ferranti Pref.	1	7	7	29/6	—	4 15 0
G.E.C. Pref.	1	6½	6½	31/3	—9d.	4 3 3
Do. Ord.	1	8	8	48/3	—	3 6 7
Henley's	1	30	30	6½	—	4 8 0
Do. 4½% Pref.	5	4½	4½	5½	—	3 16 8
India-Rubber Preferred	1	—	—	1½	—	—
Johnson & Phillips	1	5	5	28/3	—	3 10 8
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1½	+½	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

14079. "Dynamo-electric machines." International General Electric Co., Inc. May 14th, 1932. (424332.)

17301. "Electric starting devices for internal-combustion engines." Eclipse Machine Co. June 18th, 1932. (424413.)

19899. "Relaxation oscillation generators." Radioakt-Ges. D. S. Loewe and K. Schlesinger. July 15th, 1932. (Addition to 394476.) (424490.)

22938. "High-frequency inductance coils." Allgemeine Elektricitäts-Ges. August 16th, 1932. (Addition to 363697.) (424425.)

22969. "Device for comparing electromagnetic-field intensities." C. Lorenz Akt.-Ges. December 12th, 1932. (424275.)

23004. "Systems of electric motor control." British Thomson-Houston Co., Ltd., and H. F. Jefferson. August 17th, 1933. (424277.)

23188. "Electrically propelled vehicles." H. K. Ramsden and Associated Electrical Industries, Ltd. August 19th, 1933. (424571.)

23194. "Condenser microphones and circuit arrangements for use therewith." H. J. Round. August 19th, 1933. (424286.)

23229. "Oscillation generators for scanning in television and like systems." Radioakt-Ges. D. S. Loewe and K. Schlesinger. August 30th, 1932. (424429.)

24619. "Electric-carrier signalling systems." General Electric Co., Ltd., and L. I. Farren. September 5th, 1933. (424503.)

24810. "Indicators for displaying variable information." Ericsson Telephones, Ltd., J. F. T. Engblom, and C. W. Wilman. September 7th, 1933. (424430.)

25498. "Supporting members for thermionic-filament cathodes." C. Sykes, J. H. Ludlow, and Associated Electrical Industries, Ltd. September 14th, 1933. (424593.)

26558. "Electric tumbler switches." R. Bain and N. Allday. September 27th, 1933. (424434.)

27752. "Electrical plug-and-socket connections." Pye Radio, Ltd., and C. E. M. Butler. October 9th, 1933. (Cognate application 34447/33.) (424507.)

29328. "Electric hotplates and the like." General Electric Co., Ltd., O. W. Humphreys, and J. L. Rycroft. October 23rd, 1933. (424291.)

29461. "Flexible electrical conductors, in particular telephone leads." T. V. Boardman. October 24th, 1933. (424293.)

29976. "Suspension devices for overhead electric conductors." British Insulated Cables, Ltd., and J. Holland. October 28th, 1933. (424294.)

30420. "Trolley buses." Sunbeam Motor Car Co., Ltd., and J. C. Dabbs. November 2nd, 1933. (424512.)

30496. "Prepayment meters for electricity, gas and the like commodities." F. S. Ash and Associated Electrical Industries, Ltd. November 2nd, 1933. (424439.)

30598. "Electric safety cut-outs." R. Kellendorfer. November 3rd, 1933. (424360.)

31427. "Arrangement for the transmission of telegraphic signals by a picture method." Siemens & Halske Akt.-Ges. January 12th, 1933. (424518.)

31865. "Electric hotplates and the like." General Electric Co., Ltd., and G. H. Ide. November 15th, 1933. (424297.)

31880. "Electrical heaters for warming buildings." A. F. Harrison, O. L. Peard and S. M. Peard. November 15th, 1933. (424440.)

32626. "Sleeves for electric cable ends." British Thomson-Houston Co., Ltd. November 23rd, 1932. (424364.)

34868. "Potheads or terminals for electric cables." Okonite-Callender Cable Co., Ltd. December 10th, 1932. (424446.)

36046. "Arcuate carbon sliding-contact members." E. Conradty and O. Conradty (trading as C. Conradty, a firm). February 27th, 1933. (Addition to 422651.) (424530.)

1934

450. "Rectifier circuits." General Electric Co., Ltd., and N. R. Bligh. January 5th, 1934. (424598.)

5057. "Directional lighting fittings." General Electric Co., Ltd., and S. S. Beggs. February 15th, 1934. (424600.)

5782. "Production of electrical insulating materials." Steatit-Magnesia Akt.-Ges. February 21st, 1933. (424601.)

6834. "Electric insulators." British Thomson-Houston Co., Ltd. March 3rd, 1933. (424306.)

7443. "High-frequency electric oscillation generators, radio, transmitters, and the like." Marconi's Wireless Telegraph Co., Ltd. April 4th, 1933. (424455.)

7983. "Method of, and apparatus for, amplifying and rectifying high-frequency oscillations." J. Pintsch Akt.-Ges. and Dr. K. Kohl. March 17th, 1933. (424602.)

8575. "Selector arrangement for direct-call telephone systems." O. Moser. March 29th, 1933. (424534.)

10110. "Superheterodyne receivers." Marconi's Wireless Telegraph Co., Ltd. April 1st, 1933. (424383.)

10269. "Directional receiving antenna systems." Marconi's Wireless Telegraph Co., Ltd. November 4th, 1933. (Cognate application 10270/34.) (424310.)

13897. "Electric-arc convertors." E. Marx. June 24th, 1933. (424316.)

13915. "Distance-relay for the protection of electric plants." R. Widerŏe. May 9th, 1933. (424386.)

14523. "Electric-battery lamp switch." Elektrotechnische Fabrik Schmidt & Co., Ges. May 15th, 1933. (Addition to 410613.) (424317.)

17513. "Systems of irradiation." British Thomson-Houston Co., Ltd. June 13th, 1933. (424320.)

18706. "Constant-light intensity control for vitreous enclosed vapour electric discharge devices." Hanovia Chemical & Manufacturing Co. November 11th, 1933. (424541.)

18718. "Coverings for accumulator cells, particularly for stationary batteries." Britannia Batteries, Ltd. June 24th, 1933. (424394.)

18730. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 26th, 1933. (424322.)

18979. "Electro-magnetically operated mercury-switch relays." W. W. Triggs (Adlake Co.). June 27th, 1934. (424397.)

19932. "Electric incandescent lamps having at least one filament which is partly surrounded by a screen." Lampe Yvel, Auto-Lampe et Cie., Anciens Etablissements L. Levy et a Monnier. July 20th, 1933. (424467.)

21120. "Electric power cable systems for the underground transmission of electrical energy." Okonite-Callender Cable Co., Inc. July 19th, 1933. (424474.)

22288. "Devices for testing the armatures of electric motors." K. Dutschke. October 20th, 1933. (424400.)

22743. "Electrical train-illumination apparatus." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken. August 4th, 1933. (424401.)

23876. "Electron-discharge devices." British Thomson-Houston Co., Ltd. August 18th, 1933. (424610.)

23987. "Electric motors." British Thomson-Houston Co., Ltd. August 22nd, 1933. (424547.)

24350. "Navigation-aiding radio systems." Telefunken Ges. für Drahtlose Telegraphie. August 25th, 1933. (424612.)

25569. "Circuit arrangements comprising a gasfilled electric discharge tube." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 15th, 1933. (424480.)

27531. "Dynamo and transformer laminations and the like." F. Krupp Akt.-Ges. October 12th, 1933. (424327.)

28782. "Exciting arrangements for dynamo - electric machines." British Thomson-Houston Co., Ltd. October 9th, 1933. (424483.)

29770. "Electrical condensers." S. Lingard. October 17th, 1934. (424407.)

32323. "Transformer tap-changing arrangements." British Thomson-Houston Co., Ltd. November 9th, 1933. (Addition to 400962.) (424408.)

36595. "Laundry plant and like apparatus and master switches for the timed electrical control through relay devices of various operations thereof." S. Newbery. August 15th, 1933. (Divided out of 424418.) (424331.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 13th:—

Copylux. No. 557944. Class 6. Carbons for electrical purposes.—Charles H. Champion & Co., Ltd., 60-66, Wardour Street, W.1.

Leetra. No. 555808. Class 8. Electric batteries (not for medical purposes). No. 555809. Class 13. Electric lamps (ordinary) and electric torches.—Alfred Lewis, 506, Stafford House, Norfolk Street, Strand, W.C.2.

Crystalate. No. 556342. Class 50. Electrical insulating material made from thermo-plastic compositions of shellac, gums and clays.—Crystalate Gramophone Record Manufacturing Co., Ltd., Imperial House, 60-62, City Road, E.C.1.

Juvenoid. No. 557418. Class 50. Compositions mouldable under heat and pressure, made from condensation products of phenol and formaldehyde, synthetic resin, casein, or cellulose acetate.—Raphael's, Ltd., 57a-57c, Hatton Garden, E.C.1.

The Task of Standardising Frequency

AN interesting lecture entitled "Some Problems in Standardising Frequency" was given by Mr. R. H. Rawll to members of the Midland Technical Group of the Electrical Power Engineers' Association on March 20th at Birmingham. In the course of his remarks Mr. Rawll (who is the frequency-change engineer of the Birmingham Electric Supply Department) stated that to effect the main object of the Electricity (Supply) Act, 1926, which was to pool the generating resources of the whole country in the most economical manner, all generating stations, must operate at one standard frequency, which was fixed at 50 cycles per second, since 81 per cent. of the plant was already generating at that frequency. This involved the rewinding of non-standard generating plant in various parts of the country totalling approximately 1,000,000 kW and, as a natural consequence, motors and converting plant estimated at 2,056,000 h.p. had also to be replaced by 50-cycle equipment. The total expenditure on the construction of the grid, after taking all charges into account, was not likely to be less than £30,000,000, while an authoritative estimate of the cost of standardising the frequency was £16,300,000.

The vast bulk of the work involved in carrying out the standardisation of frequency was in connection with the changing of consumers' plant. The task now being carried out was of such a magnitude and character that nothing like it had ever been attempted before by the electrical engineers of any other country in the world. Since the Birmingham electricity undertaking originally generated at 25 cycles per second, the change-over of its high-pressure distribution system to the standard 50 cycles, with the consumers' plant connected thereto, was commenced in August, 1931. Although only approximately three-quarters of the work involved had so far been completed, up to the present time 153,750 kW of generating plant, 251,510 h.p. of motors, 411,367 kVA of transformers, and 72,788 kW of converting plant had already been changed over. Also, in order to effect this, it had been necessary to install additional generating plant of 55,000 kW capacity, 112,000 kVA of trunk transformers, and 88 miles of high-pressure cable. Detailed explanations, together with numerous lantern slides, were also given, showing how the actual change-over work was being carried out in Birmingham.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Atherton.—Houses (34), Hog Fold Estate; U.D.C. surveyor.

Banbury.—Reconstruction of the Grand Theatre; Drury and Gomersall, Manchester.

Bedfordshire.—Schools, Dunstable and Luton, for County E.C.

Birkenhead.—Houses (2,762), Woodchurch Estate; borough surveyor.

Birmingham.—Houses, Handsworth, Ivy House Farm Estate, Billesley Farm Estate, Yardley Wood, Northfield and Quinton Estate; city engineer.

Blackpool.—Houses (45), Cannock Avenue, Bispham; J. Fielding & Sons.

Blyth.—Houses (1,250) during next five years, and swimming baths, public hall, concert hall and extensions to the Municipal Buildings; L. Leeper, borough engineer.

Bournemouth.—Cinema, restaurant and flats, Exeter Road, for W. J. Mackeen.

Bromyard.—Houses (54), Sherford House Estate, for James & Bateman.

Cardiganshire.—Girls' school, Aberystwyth, for County E.C.

Carlisle.—Houses (1,200); P. Dalton, city engineer, 18, Fisher Street. Alterations to premises for Messrs. Binns; H. Foxall, architect, 54, Lowther Street.

Carshalton.—School, St. Helier Estate (£31,847); Ashford Builders Co., Ltd.

Castle Ward (Northumberland).—Houses (46), Hazelrigg; H. Kelly, builder, St. Mary's Place, Newcastle-on-Tyne.

Chatham.—Houses (34), Symons Avenue; H. Goodsell, builder, 32, Sandling Road, Maidstone.

Cheltenham.—Houses, Whaddon and Moors Estate; borough surveyor.

Colchester.—Library (£20,000) and fire station; city engineer.

Consett.—Houses (200) on new estate; J. J. Eltringham, architect, Derwent Street, Blackhill.

Coventry.—Houses (67), Radford Estate; housing director.

Coxhoe (Durham).—Houses (81) by the North Durham Estate & Construction Co., Ltd.

Denholme (Yorks).—Houses (32); U.D.C. surveyor.

Dewsbury.—Baths, Wheelwright Street (£31,000); borough engineer. Extensions to factory, Clarkson Street; E. Fielding & Co.

Dumfries.—Extensions, including surgical block and nurses' hostel, Dumfries and Galloway Royal Infirmary, for the governors (£70,000); secretary.

Durham.—Secondary school for C.C.; F. Willey, architect, 34, Old Elvet.

Eltham.—Buildings, 145-7, High Street; Trussed Concrete Steel Co., Ltd.

Essex.—School (480 places), Chadwell Heath, for County E.C.; J. Sargent, director of education, Chelmsford.

Folkestone.—Extensions, Royal Victoria Hospital (£70,000); secretary.

Gainsborough.—Houses (52), Wilson Street; S. Algar, U.D.C. surveyor.

Glasgow.—Factory and extensions (£50,000) for the Scottish Co-operative Wholesale Society. Reconstruction of Waverley Cinema, Shawlands Cross; the manager.

Golborne.—Houses (106); U.D.C. surveyor.

Great Yarmouth.—Houses, various sites, and flats, North Denes; borough engineer. Development of Crow Hall Farm Estate, Middleton Road; W. West.

Hampshire.—School, Copythorne, for County E.C.

Hampton (Middlesex).—Development of Sherwood Park Estate; Thorogood Bros. & Sons.

Hanwell.—Houses (1,663); L.C.C. Housing and Public Health Committee.

Hinckley.—Houses (246), Wykin Hall Estate; U.D.C. surveyor.

Huddersfield.—Houses (176), Fartown; borough engineer.

Irvine.—Houses (100), electrical work, Quarry Road; Robert Frew, architect, High Street.

Kearsley.—Houses (36), Spindle Point (Manchester Road) site; Ernest Tonge & Sons, Ltd., Station Road, Swinton, near Manchester.

Kidderminster.—Houses (62), Foley Park Estate; borough surveyor.

Knottingley.—Houses (24); Leadley (Askern), Ltd., builders.

Lancaster.—Baths, Caton Road; borough engineer.

Leicestershire.—Modern school, South Wigston, and extensions to boys' school, Melton Mowbray, for County E.C.

Lincolnshire.—High school for girls, Boston, Holland, and science wing for Spalding Grammar School, for County E.C.; director of education, Spalding.

London.—(Finsbury).—Reconstruction of Bath Street School (£49,720); L.C.C. architect. (Lewisham).—Houses (81), Hall Park Estate; A. J. Glock, Ltd. Rebuilding, 89-91, High Street; G. T. Harman. (Poplar).—Flats, Oban Street (£27,372); Henry Boot & Sons, Ltd. (St. Marylebone).—Block of flats, 76-82, Maida Vale, and premises for Debenhams, Ltd., Marylebone Lane; Gunton & Gunton. (Stepney).—Tenements, Ellen Street (£30,000); L.C.C. architect. (W.1).—Cinema (£500,000), Tottenham Court Road, for Arthur Segal, of Paramount Film Service, Ltd.

Macclesfield.—Houses (140), near Pennington; C. Lees, builder, Congleton Road.

Manchester.—Houses, Meade Hill Road, Windsor Road, and Northhurst Avenue, Crumpsall; J. C. Whitelegge, 4, Pennell Street, Clayton. Houses (32), Parkbrook Road, near Altrincham Road, Northern Etchells; S. Van den Bergh, Ltd., 11, Albion Mews East, London, W.2. Houses, Sandilands Road, Partington Avenue, East Grange and Grange Court, Baguley; Jonathan Partington, Ltd., Wade Street, Middleton Junction. Houses, near Roundwood Road, &c., Northenden; Houselet Development Co., 17, St. Ann's Square. Houses, Springbridge Road, Chorlton-cum-Hardy; A. Allen, 120, Oxford Road, Old Trafford. Extensions to bakeries, Bank Street, Levenshulme, for Robinson's Confectioners, 127, Stockport Road, Levenshulme; J. Lee & Sons (Stockport) Ltd., builders, 36, Shaw Heath, Stockport.

Margate.—Houses (37); Building & Public Works, Construction Co., Ltd., builders, Swindon.

Middlesbrough.—Houses (50), Whinney Banks Estate and Brambles Farm Estate; S. E. Burgess, borough engineer.

Middlesex.—Elementary school, East Kingsbury, for County E.C.; secretary.

Monmouthshire.—School, Blaenavon, for County E.C.; director of education, Newport.

Mottingham (Kent).—Hotel, L.C.C. housing estate (£25,000), for the Improved Public House Co., Ltd., Red Lion Street, London, W.C.; C. J. Theobalds, managing director.

Newburn-on-Tyne.—Houses (64), West Denton Estate; R. G. Pearson, architect, Clayton Street, Newcastle-on-Tyne.

Newcastle-on-Tyne.—Additions to Walkergate Council School for C.C.

Northallerton.—Bus depot for United Automobile Services, Ltd.

Northumberland.—Motor garages at County police headquarters, Morpeth, for C.C.; W. W. Tasker, county architect, County Hall, Newcastle-on-Tyne.

Paignton.—Shops, offices and flats, Torquay Road; C. Norrish & Sons.

Penrith.—Premises, Sandgate; T. Altham & Son.

Rawmarsh.—Houses (42), Green Lane Estate; J. R. S. Creighton, architect, Council Offices, Parkgate, Yorks.

Reading.—Business stores, Broad Street, for Montague Burton Estates, Ltd., Leeds. School, Hemdean Road, Caversham, for Borough E.C.; director of education.

Romford.—Houses and flats, Rush Green Estate; Cripps Bros.

Rotherham.—Houses (32), Doncaster Road; D. B. Jenkinson.

Ryton-on-Tyne.—Houses (52); Newcombe & Newcombe, architects, 29, Eldon Square, Newcastle-on-Tyne.

Sanquhar.—Houses (50); William Scott, architect.

Sedgley.—Houses (56), Gornal Estate (£20,357); C. Coulson, Dudley.

Shrewsbury.—Houses (150), Harlescott Estate; Fletcher Estates (Harlescott), Ltd.

South Shields.—Houses, Wenlock Road and Newcastle Road; F. Wills, builder, Bents Park Estate. Flats, Commercial Road (£32,425); borough engineer. Hotel, Coast Road; J. H. Morton & Son. High School, Lisle Road, for E.C.; G. R. Smith. Alterations to premises, Stanhope Street, for Smiths, Ltd.; F. W. Newby, architect, 37, King Street. Rebuilding of Empire Theatre (£20,000), for Blacks (South Shields) Theatres, Ltd.; Henderson Brothers, builders, Smith Street, Tyne Dock. Reconstruction of Stanhope Road School (£20,946); J. Jackson & Son, Newcastle-on-Tyne.

Sowerby Bridge.—Houses (50), bungalows and flats; U.D.C. surveyor.

Spalding.—Houses (48), Winsover Road; U.D.C. surveyor.

Stockton-on-Tees.—Houses (236), near South Mount Pleasant; A. E. Hobbs, builder, Hill House, Norton-on-Tees. Houses and shops; G. P. Stainsby, architect, 25, High Street. Office and store for Ashmore, Benson Pease & Co., Ltd., Parkfield Works, Bowesfield Lane.

Stoke-on-Trent.—Houses, Abbey Hulton and Meir; city architect.

Stourport.—Houses (48); U.D.C. surveyor.

Stroud.—Houses (64), Lightpill, for Stroud Properties, Ltd. Houses (80); U.D.C. surveyor.

Sunderland.—Houses (32), Daier Avenue; W. Rutherford, builder, Sea Road. Houses (442), High Southwick Estate, and child welfare centre and clinic at the East End; borough engineer.

Surrey.—School, Merton Park Estate, Morden (£14,650), for County E.C.

Swansea.—Girls' college and lecture hall, Derwen Fawr Road; Rev. Rees Howells. Extensions to Glynn Vivian Art Gallery; borough architect. Rebuilding, 271-2, Oxford Street, for Marks & Spencer, Ltd.

Swindon.—Houses (50), Hurst Estate; borough surveyor.

Swinton (Lancashire).—Cinema, East Lancashire Road; Foden, Hemm & Williams, architects.

Truro.—Houses (244), Tregolls; city surveyor.

Wallasey.—Boys' and girls' Central School, Coronation Avenue, Upper Brighton, for E.C.; Willink & Dod, architects, Cunard Buildings, Pier Head, Liverpool.

Ware.—Houses (28); Anderson & Co., builders, Baldock Street.

Watford.—Houses (232), (£85,512); borough engineer.

West Hartlepool.—Swimming baths and slipper baths; F. Durkin, borough engineer, Town Hall. Additions to shops and offices for W. S. Donaghty; Heslop & Johnson, architects, Upper Church Street.

West Riding.—School, Queensbury, for County E.C.; education architect, Wakefield.

West Sussex.—Senior school, Westloats Lane, Bognor, for County E.C.

Whitby.—Extension of War Memorial Hospital; J. G. Thomlinson, secretary.

Woking.—Houses (34), Hollies Avenue, Sheerwater Estate; U.D.C. surveyor.

Worcester.—Houses (40); city surveyor.

Worksop.—Houses (86), Lincoln Street; C. O. Allsopp, borough surveyor, Town Hall.

Yeovil.—Two senior schools (£38,740) for borough E.C.; education architect. Extensions to works, for Aplin & Barrett and the Western Counties Creameries, Ltd.; F. R. Bartlett, Ltd., builders.